Public Health Reports

'ME 64 JULY 1, 1949 NUMBER 26

TUBERCULOSIS CONTROL ISSUE NO. 41

IN THIS ISSUE

Editorial—The First Five Years

Pulmonary Findings and Antigen Sensitivity Among Student Nurses, IV

X-Ray Films, Screens, and Developers, VII

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G. St. J. Perrott, Chief of Division

CONTENTS

Page

Editorial—The first five years. Leonard A. Scheele ... 817

Studies of pulmonary findings and antigen sensitivity among student nurses. IV. Relationship of pulmonary calcification with sensitivity to tuberculin and to histoplasmin. Jennie C. Goddard, Lydia B. Edwards and Carroll E. Palmer ... 820

Characteristics of commercial X-ray screens and films, VII. Willard W. Van Allen ... 847

INCIDENCE OF DISEASE

United States:
- Reports from States for week ended June 11, 1949 ... 849

Foreign reports:
- Canada—Provinces—Notifiable diseases—Week ended May 21, 1949 ... 852
- Madagascar—Notifiable diseases—April 1949 ... 852
- Jamaica—Notifiable diseases—4 weeks ended May 28, 1949 ... 853
- New Zealand—Notifiable diseases—5 weeks ended April 30, 1949 ... 853
- Switzerland—Notifiable diseases—January–March 1949 ... 853
- Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—
  - Cholera ... 854
  - Plague ... 854
  - Smallpox ... 854
  - Typhus fever ... 854
  - Yellow fever ... 855

Deaths during week ended June 4, 1949 ... 855

Public Health Reports

Vol. 64 • JULY 1, 1949 • *No. 26*

—Editorial—

The First Five Years

Anniversaries are useful dates for stock-taking. The Nation-wide Federal tuberculosis control program was inaugurated 5 years ago, in July 1944 with the creation of the Division of Tuberculosis. Although the tuberculosis control program is still developing, we can already see concrete evidence of the direction it is taking.

Tuberculosis is in retreat. The national tuberculosis death rate in 1944 was 41.3 per 100,000 population; in 1947, it was 33.5 per 100,000. On the basis of sample studies, the National Office of Vital Statistics estimates that the rate for 1948 will be still lower; perhaps about 31 per 100,000.

We can be sure that the Nation-wide program of mass case finding, diagnosis, follow-up, and treatment will accelerate the decline in tuberculosis mortality. The program is not the sole factor responsible for the retreat of tuberculosis; but without intensive, well-organized activities in every State and Territory, we would still be on the defensive against this disease. Through the development and refinement of effective control techniques, we have been able to take the offensive. And we shall hold the offensive, until tuberculosis is no longer a major cause of death and disability in the United States.

The success of our Nation-wide attack on tuberculosis is due to the zeal with which State and local health departments and voluntary agencies have undertaken new enterprises in this field. In the fiscal year 1948, tuberculosis control led all other health programs in the number of States and Territories planning to expand services. Basic control activities, such as a central register of reported cases and free laboratory diagnostic services, had been established in all 53 State and Territorial health departments.

Mass chest X-ray surveys and diagnostic services for private physicians and local health agencies are key activities in modern tuberculosis control. Virtually all the State and Territorial health agencies are providing these services. These agencies own and

This is the forty-first of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear in the first week of each month. The series began with the March 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

840020—49——2

operate more than 1,000 X-ray units. Through the combined efforts of Federal, State, and local official health agencies and voluntary organizations, more than 10 million persons are being X-rayed annually.

Although the States and Territories have expanded their basic case-finding, diagnostic, and follow-up services each year since the program began, other services essential to tuberculosis control are not developing with comparable speed. In 1948, for example, only 32 States included the promotion of local out-patient pneumothorax centers for patients who are not hospitalized. Although more than 1,300 monthly tuberculosis diagnostic-clinics were held throughout the country, these have centered largely in the metropolitan areas so that many communities still remain without such services.

It is true that laboratory facilities have expanded to the point where bacteriological services for the diagnosis of tuberculosis are now available to physicians throughout the country. More than half a million such examinations are being made in public health laboratories annually. Yet, it appears that physicians are not taking full advantage of these services in proportion to the number of patients now being referred to them as the result of mass chest X-ray surveys.

Physicians, as well as hospitals, could make a greater contribution to tuberculosis control through better reporting of cases which come to their attention. In too many instances, in too many parts of the country, the State and local health agencies first learn of cases of tuberculosis when they check the death certificates.

In the future, greater emphasis must be placed on meeting the community's needs for hospital beds and trained personnel to care for tuberculous patients. Without treatment, the patients discovered will continue to spread their disease and many will die needlessly. The means test and conflicting, unrealistic residence requirements still bar the doors of too many sanatoria to patients urgently in need of hospital care. The shortage of tuberculosis nurses—not an insoluble difficulty when more affiliation programs between schools of nursing and recognized tuberculosis institutions are achieved—also stands as an impediment to the efficient management of active tuberculosis. These are problems which can and must be worked out by community leaders.

More emphasis must be placed, too, on understanding and dealing effectively with the emotional and social factors in tuberculosis. Psychiatric consultation, medical social service, and rehabilitation are integral parts of tuberculosis control. Although progress has been made in these directions, the fact that only 20 States included medical social services in their tuberculosis control activities for 1948 shows that much remains to be done. Furthermore, even though all but

three State health departments had arranged for cooperation with their State vocational rehabilitation agencies, progress was slight toward complete and individualized rehabilitation services for the tuberculous. To be sure, there are shortages of personnel and facilities; but until we try to overcome these gaps in our service, we shall not have begun to build a truly effective tuberculosis control machinery in this country.

We believe that the cooperative research activities of the Division of Tuberculosis will eventually provide the answers to the many still-unresolved problems of tuberculosis epidemiology, prevention, and therapy. In the meantime, however, the actual work of coming to grips with the day-to-day problems of tuberculosis control remains the responsibility of the State and local health departments, sanatoria, voluntary agencies, and the private physicians. As the reservoir of tuberculous infection recedes, these groups will find it more difficult, more costly, and more important to locate the remaining sources of infection. This has been the experience in the fight against other infectious diseases. The ultimate victory over tuberculosis will require, therefore, even more vigorous action in the ensuing years of Federal-State cooperation.

LEONARD A. SCHEELE, *Surgeon General.*

Studies of Pulmonary Findings and Antigen Sensitivity Among Student Nurses

IV. Relationship of Pulmonary Calcification with Sensitivity to Tuberculin and to Histoplasmin*

By JENNIE C. GODDARD, B. A., LYDIA B. EDWARDS, M. D., and CARROLL E. PALMER, M. D.**

In the fall of 1943, a long term, comprehensive program for the study of tuberculosis was cooperatively undertaken by the National Tuberculosis Association, the Public Health Service, and a large number of schools of nursing located in representative metropolitan areas throughout the United States. The program was visualized as being essentially a "research facility" for the uniform, systematic, and continuous collection of a wide variety of pertinent observations on a large number of individuals who were exposed to substantial risks of becoming infected with tuberculosis. A "research facility" or such scope, employing uniform techniques and methods, having wide geographic coverage, continuing observations on a large number of cases, and involving centralized direction, was considered as both appropriate and necessary for investigating many fundamental problems in the pathogenesis of tuberculosis. One of the basic problems most urgently needing solution, and one which seemed to demand such a facility for an adequate investigation, was a clarification of the controversial question currently referred to as "pulmonary calcification in tuberculin negative persons."

A detailed review of published papers on the subject of pulmonary calcification in nonreactors to tuberculin has been made by Christie and Peterson (*1*), and it will suffice here to summarize briefly only the most general and pertinent evidence available early in 1943. First, it seemed necessary to accept as established facts that tuberculous infection is almost invariably associated with sensitivity to tuberculin, that it can cause lesions in the lung parenchyma and mediastinal lymph nodes, and that the lesions frequently heal with deposition of calcium which can be seen on X-ray films of the chest for many years. It appeared quite certain that tuberculous infection can and does *cause* shadows on the X-ray that are commonly interpreted as calcification. Second, there could be no doubt that pulmonary calcification entirely typical and character-

*For previous studies in this series see Palmer, Carroll E.: Nontuberculous pulmonary calcification and sensitivity to histoplasmin. Pub. Health Rep. 60: 513–520 (1945); Palmer, Carroll E.: Geographic differences in sensitivity to histoplasmin among student nurses. Pub. Health Rep. 61:475–487 (1946); Edwards, Lydia B., Lewis, Ira, and Palmer, Carroll E.: III. Pulmonary infiltrates and mediastinal adenopathy observed among student nurses at the beginning of training. Pub. Health Rep. 63: 1569–1600 (1948).

**Statistician, senior surgeon, and medical director, respectively, from the Field Studies Branch, Division of Tuberculosis, Public Health Service.

istic of healed tuberculous lesions is not infrequently observed in apparently healthy persons, including young children, whose tuberculin tests are currently interpreted as negative. Third, it was apparent from the reports of a number of basic studies that the frequency of pulmonary calcification varies widely in different geographic areas in the United States, and that this variation is not closely correlated with other evidence of tuberculosis, particularly mortality. A fourth, but less well established point involved evidence that pulmonary calcification in nonreactors to tuberculin is much more frequently encountered in some parts of the country than in others.

Attempts to explain and reconcile all of these issues led directly to the conclusion that at least one of several long established and generally accepted tenets in the pathogenesis of tuberculosis must be incorrect. On the basis of almost incontestable evidence, it was necessary to believe either that the tuberculin test was much less specific and much less stable than it was generally thought to be, or that the interrelationships of tuberculous infection, the tuberculin reaction, and pulmonary calcification was quite different in different parts of the country, or that pulmonary calcification was far from pathognomonic as evidence of healed tuberculous infection. The implications that the tuberculin test might be grossly inefficient as an index of tuberculous infection, or that pulmonary calcification was not pathognomonic of healed pulmonary tuberculosis, appeared to contradict two of the best founded concepts concerning tuberculosis.

The majority of the authorities in the tuberculosis field emphatically insisted, primarily on evidence from autopsy and pathological material, that tuberculosis was the only disease that need be seriously considered as a common and widespread cause of pulmonary calcification and attempted to rationalize the dilemma by questioning the specificity and stability of the tuberculin reaction. Other authorities, however, steadfastly defended the tuberculin test, creating in the course of its defense, considerable controversy over technical difficulties in performing and reading the test and uncertainties of interpretation in the roentgenologic diagnosis of pulmonary calcification. A few investigators, attempting to bridge the gap, cited a recent report by Aronson et al. (*2*) which indicated that in the southwestern part of the United States coccidioidomycosis is an important and frequent cause of pulmonary calcification. Some even suggested that the only satisfactory way to explain all of the contradictory evidence would be to postulate the existence of another disease, one which would cause pulmonary calcification, would not produce sensitivity to tuberculin, and had a geographic distribution in the United States different from that of tuberculosis and of coccidioidomycosis.

A full scale investigation of this whole complex problem was thought to be of sufficient importance to warrant its being considered one of

the major objectives of the cooperative study of tuberculosis among student nurses. The program, therefore, particularly its epidemiological aspects, was especially designed to facilitate a broad investigation of this problem.

In 1945 a highly significant advance was made in the solution of the general problem in the United States of pulmonary calcification in nonreactors to tuberculin. Christie and Petersen (*1*) from observations on children in Tennessee and Palmer (*3*) in the first paper from this cooperative investigation on student nurses, reported the results of intradermal testing with histoplasmin. The results of both of these studies led the authors to the conclusion that the unknown disease, postulated as the etiological agent of the pulmonary calcification observed in nonreactors to tuberculin, actually did exist, and that it was most probably a mild subclinical infection with the fungus *Histoplasma capsulatum*, or a closely related organism. During the past 4 years, studies on fungus infections, especially on *H. capsulatum* infection and the disease histoplasmosis, have gone rapidly forward and most of the published reports support the initial findings expressed by Christie and Petersen, and Palmer.

This study primarily represents an extension of the first report which dealt with the relationship of pulmonary calcification and sensitivity to tuberculin and to histoplasmin.

Source and Character of Data

When the program was initiated in the fall of 1943, the schools of nursing numbered 38 and were located in the metropolitan areas [1] of Baltimore, Detroit, Kansas City (Kansas and Missouri), Minneapolis, New Orleans, and Philadelphia. The group of participating schools was increased by inclusion of nursing schools in Columbus (Ohio) during the spring of 1944, in Los Angeles and San Francisco during the fall of 1944, and in the Denver area during the fall of 1945. By that time, other schools in Los Angeles, Minneapolis, and Philadelphia had joined the program to bring the total number of participating schools to 76, a number that was maintained through the spring 1947 test session.

From the beginning of the program all student nurses enrolled in the participating schools were tuberculin tested at regular 6-month intervals with the exception that retesting was not routinely done on nurses who, on their first or subsequent tuberculin test, gave very strong reactions to our first dose of tuberculin. In the spring of 1945, all nurses under observation were tested with histoplasmin. At the subsequent test sessions, newly admitted students and all those in

[1] Included with the nursing schools located in Kansas City, Mo., is one school in Independence; with Minneapolis, two schools in St. Paul; with San Francisco, two schools in Oakland; and with Denver and Los Angeles, several schools in nearby communities.

schools joining the program have been histoplasmin tested. Retesting with histoplasmin has not been routinely carried out, except in selected cities. The majority of the student nurses have also received tests with other fungus antigens.

The routine semiannual skin tests were made by a special team of nurses or doctors of the Public Health Service who have periodically visited the cooperating schools each spring and fall since 1943. In general the team spent one week in each city, usually traveling by plane to a different city over the weekend, according to a prearranged and organized schedule. Each school was visited three times during the week, either Monday, Wednesday, and Friday, or Tuesday, Thursday, and Saturday. On the first day the first dose of tuberculin and the fungus skin tests were given; on the second day, the tests were read and the second dose tests were given; and on the third day, the second dose tests were read. Uniformity in interpretation of the reactions has been considered of the utmost importance. Only two persons have been responsible for the reading of more than 95 percent of the tests performed since the beginning of the study and these two persons read together for more than one test session. The number of skin tests given and read by the team now totals nearly 300,000 and one member of the team, Assistant Nurse Officer (R) Virginia S. Trevett has interpreted over 200,000 skin tests.

Beginning in the fall of 1943, the student nurses under observation have had X-ray films of the chest semiannually, at approximately the same periods as the skin tests. A more intensive X-ray follow-up was maintained for selected groups, including those who became sensitive to tuberculin or one of the fungus antigens or who developed abnormalities of the chest as shown on their X-ray films. The X-ray films were made and read by the radiologists in hospitals of the cooperating schools and then were sent to the Field Studies Branch in Washington, where they were interpreted for the purposes of the program. While the file of X-ray films on each nurse was kept in the Washington Office, satisfactory arrangements were made with the nursing schools to return films to the hospitals for their use in connection with the student health services of the school. With the exception of one school, 14″ x 17″ films were used. Again, uniformity of interpretation was considered of great importance, and although more than one roentgenologist in the Washington Office participated in the work, every attempt was made to insure comparability of interpretation.

The basic data of the present report include observations on all student nurses having at least one tuberculin test, one histoplasmin test, and one chest X-ray film, in the period between the beginning of the study in 1943 and the spring of 1947. The student nurses meeting these criteria number 16,320.

840020—49——2

Only the first tuberculin test and the first histoplasmin test for each student are used in classifying sensitivity levels. Neither the interval between the time a nurse entered training and the time she received the two tests nor the interval between the two types of tests are taken into account in the present analysis. Most of the students received their initial tuberculin test during their first year in training. Since histoplasmin testing was not introduced into the program until the spring of 1945, 18 months after the tuberculin testing was begun, only about 60 percent were tested with histoplasmin during the first year of training. Since there are indications that the proportion of student nurses sensitive to tuberculin increases significantly during training, while there is no marked change during training in the proportion sensitive to histoplasmin, classification of nurses according to their first test would not appear to introduce any significant bias into the analysis.

Histoplasmin sensitivity has been shown (*4*) to vary markedly among residents of the different sections of the country and to have particularly high prevalence among residents of eastern central States. While residence, as such, has not been used as a classifying item in the present report, the location of the training center proves a usable index of residence, according to analysis now in progress.

This study population is homogeneous with respect to age, sex, and race:[2] about 80 percent were between 20 and 22 years of age, all are female, and it is estimated that less than 1 percent are nonwhite.

Tuberculin Tests

From the beginning of the program, the tuberculin used has been the cryochemed form of purified protein derivative (PPD-S) prepared by Dr. Florence B. Seibert of the Henry Phipps Institute in Philadelphia. The intradermal tests were made in the middle of the volar aspect of the forearm, about 3 inches below the anticubital fossa. The reactions were read at 48 hours. The routine procedure has been to give a first dose of 0.0001 mg. in 0.1 cc. of solution; those failing to give reactions of at least 10 mm. of firm induration to this dose were given a second dose of 0.005 mg. Occasionally students with previous severe reactions to tuberculin were given a preliminary test dose of 0.00001 mg.

In reading the tuberculin reactions, the widest transverse diameters of erythema and of induration were measured and recorded in millimeters. Vesiculation and other complications were also noted. In addition to the recorded measurements of erythema and induration, all indurations of 5 or more mm. were also classified into four qualitative categories designated as I, II, III, and IV.

[2] The two participating Negro schools of nursing are excluded from the present analysis, since the number of student nurses observed is insufficient to provide properly the important racial comparisons.

I is used to describe a typical textbook reaction with an area of induration which is firm, elevated, clearly defined, and well circumscribed. At the other end of the scale, IV is used to describe questionable induration which is very soft, ill-defined, and not well circumscribed. II and III are used to describe reactions which do not entirely fulfill the exacting conditions for either I or IV, but fall somewhere between the two; II denotes a reaction showing greater similarity to that described as I; and III, showing greater similarity to IV.

While it must be recognized that these descriptive, qualitative categories are not separate entities but are gradations of density or "palpability," they add better definition to the interpretation of the reaction than can be obtained by measurements alone. The need for such description of reactions arose from the observation that workers in the field of tuberculosis differ greatly in what they interpret as induration. For example, some workers would consider only our categories I and II as sufficiently distinct to be designated and recorded as induration; they would classify our categories III and IV as questionable or as erythema only. Other workers would record all categories, I through IV, as measurable induration.

In the analysis of the material to be presented, student nurses were classified in several different ways according to their tuberculin sensitivity. The basic categories most frequently used, are as follows:

1. Definite reactors (with induration of 5 mm. or more, described as I, II, or III to 0.0001 mg. PPD–S).
2. Questionable reactors (with induration of 10 mm. or more described as I or II, to 0.005 mg. PPD–S).
3. Essentially nonreactors (with induration of less than 10 mm. described as I or II, with all indurations described as III or IV, and with erythema only of 10 mm. or more, to 0.005 mg. PPD–S).
4. Nonreactors (with no reaction or with small erythema only, to 0.005 mg. PPD–S).

For the purpose of more general analysis, these categories have been combined as indicated in the text.

Histoplasmin Tests

Histoplasmin tests were made by intradermal injections of 0.1 cc. of a 1/1000 dilution of histoplasmin (a filtrate of broth culture of *H. capsulatum*) in a manner that corresponded to the procedure for the tuberculin tests. Reactions were read and recorded by the same person and in the same way as for the tuberculin tests, with an additional reading at 96 hours after injection whenever feasible with the test schedules. In the present analysis, classification of histoplasmin sensitivity is derived from either the 48-hour or the 96-hour reading, whichever gives the more definite reaction. These decisions on dosage and hour of reading as well as the classification of the histoplasmin reactions are obviously arbitrary, but they are of necessity so, in the light of present deficiencies of knowledge of optimum procedures.

Dr. C. W. Emmons of the National Institutes of Health kindly furnished the histoplasmin[3] used in the tests performed throughout all participating schools in the spring and fall of 1945 and in the schools located in Kansas City, in the spring of 1946. Histoplasmin used for the other spring 1946 tests and for all tests performed in the fall of 1946 and the spring of 1947 was prepared by Dr. Arden Howell, Jr., of the Field Studies Branch.

During the latter two test sessions, one common lot of histoplasmin (H-15) was routinely used for testing. However, for the spring 1946 tests, several different lots of histoplasmin were used in the various training centers. This divergence from uniformity is of less importance than might appear. The Cadet Nurse Corps program, stimulating enrollment of student nurses during the war, had been discontinued the preceding fall and enrollment reached a low ebb in the spring of 1946. Since newly enrolled students that spring in the participating schools numbered about 800, only about 5 percent of the total group under analysis were classified according to their spring 1946 histoplasmin tests. All histoplasmin tests were done with 1/1000 dilutions of stock antigens and a very high proportion of them with only two different lots of histoplasmin, Emmons' H-3 and Howell's H-15. Although controlled comparison of lots H-3 and H-15 has not been made, enough work has been done to indicate that in 1/1000 dilutions they were quite comparable.

For the purpose of the present analysis, the nurses were classified by their histoplasmin reactions into the following three categories:

1. Definite reactors (with induration of 5 mm. or more, described as I, II, or III).
2. Doubtful reactors (with induration of less than 5 mm., or of any size described as IV; and erythema of 5 mm. or more).
3. Nonreactors (with no reaction or small erythema of less than 5 mm.).

Pulmonary Calcification

Without knowledge of the results of the skin tests, the roentgenologists of the Field Studies Branch interpreted the individual X-ray films with respect to a number of specified factors, including calcification in the lung parenchyma and in the mediastinal lymph nodes.

Whenever more than one film was available for a student, the films were also read serially. For those nurses who discontinued training or were graduated, all films available were reviewed serially and a final summary was prepared. In the present analysis, the final summary or the last serial reading has been employed as the basis for determining pulmonary calcification whenever such were available.

[3] This is the antigen designated as H-3 in the paper by Emmons et al. (5).

This procedure tends to increase stability of interpretation and to minimize the effect of differences in the technical quality of individual films.

Pulmonary calcification has been classified by the roentgenologists into three categories:

1. Definite (opacities whose size, sharpness, irregularity, and density were so characteristic that the diagnosis of calcium was indisputable).

2. Probable (opacities similar to the above, though somewhat less characteristic, but such that vascular structures and calcifying costal cartilages could be excluded).

3. Questionable (opacities which possibly could be questioned as calcium but which the interpreter felt more probably were variations of the normal pattern of lung markings; particularly those shadows which might represent blood vessels seen in cross section).

For the purposes of the present analysis, persons whose chest films were designated by the roentgenologists as showing definite and/or probable calcification in the lungs or in the mediastinal lymph nodes, have been considered to have pulmonary calcification; those whose films were designated as showing only questionable calcification, have been classed with the negatives.

General Findings

Histoplasmin Reactors by Metropolitan Area

Among the 16,320 student nurses included in the present analysis, 23.2 percent had some reaction to histoplasmin, 19.5 percent having definite and 3.7 percent doubtful reactions.

The prevalence of histoplasmin sensitivity in the several metropolitan areas diverges widely from this over-all average, ranging from the high rate of 65 percent in Kansas City, Mo., to the relatively low rate of 7 percent in Minneapolis. These percentages and their range conform closely to the preliminary findings reported in 1945 (*3*).

The percentages of definite and of doubtful histoplasmin reactors among the nurses tested in each of the 11 cities are presented in table 1 and figure 1, the cities being listed in descending order by the percentage of histoplasmin reactors found. It is evident that there are three cities with outstandingly high rates: Kansas City, Mo., with 65 percent, Columbus, with 61 percent, and Kansas City, Kans., with 51 percent. Thereafter, the change in the sensitivity level from city to city is not a gradual and uniform decline, but tends to level off into three rather distinct plateaus: New Orleans and Baltimore, with rates of slightly more than 25 percent; Detroit, Los Angeles, and Philadelphia, with rates approximating 14 percent; and San Francisco, Denver, and Minneapolis with rates below 10 percent.

Table 1. *Number and percentage of definite and of doubtful histoplasmin reactors among student nurses tested in specified cities*

City	Percentage of student nurses			Number of student nurses		
	Definite and doubtful reactors	Definite reactors	Doubtful reactors	Definite reactors	Doubtful reactors	Total number tested
Individual Cities						
Kansas City, Mo	64.8	57.7	7.1	653	80	1,131
Columbus, Ohio	60.5	55.6	4.9	740	65	1,330
Kansas City, Kans	51.1	45.3	5.8	241	31	532
New Orleans	28.4	21.2	7.2	273	93	1,290
Baltimore	25.3	22.0	3.3	434	65	1,971
Detroit	14.3	12.6	1.7	158	21	1,250
Los Angeles	14.3	10.6	3.7	189	65	1,778
Philadelphia	13.7	10.5	3.3	228	71	2,179
San Francisco	9.7	7.0	2.7	78	30	1,111
Denver	8.4	6.6	1.8	88	24	1,320
Minneapolis	6.9	4.2	2.7	101	65	2,419
Grouped Cities						
Columbus, Kansas City	60.5	54.6	5.9	1,634	176	2,993
Baltimore, New Orleans	26.5	21.6	4.8	707	158	3,261
Detroit, Los Angeles, Philadelphia	14.1	11.0	3.0	575	157	5,207
Denver, Minneapolis, San Francisco	7.9	5.5	2.4	267	119	4,859
All cities	23.2	19.5	3.7	3,183	610	16,320

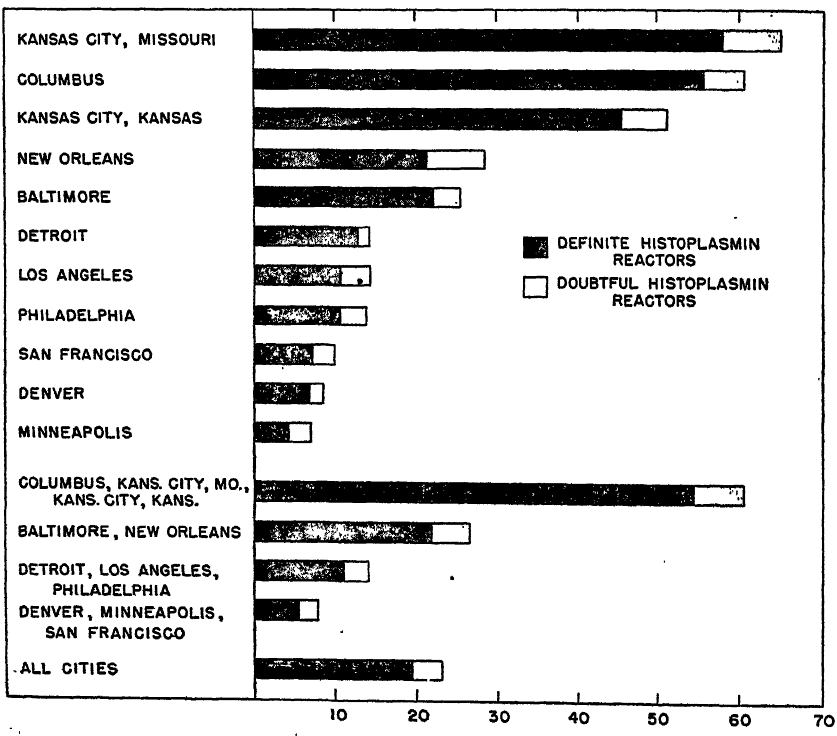


Figure 1. Percentage of definite and of doubtful histoplasmin reactors among student nurses tested in specified cities and groups of cities.

In the lower section of the table and graph, the cities have been combined so that the students tested in cities with approximately similar levels of histoplasmin sensitivity have been grouped together. For this purpose the three high cities, though exhibiting a fairly wide difference between their rates have been considered as one group, representing areas of high prevalence of histoplasmin reactors. Within each of the four groups thus created, the frequency of reactors does not vary significantly from one city to another.

Since criteria for defining a positive histoplasmin reaction are not yet available, and since evidence from previous studies indicates that reactions classified as doubtful may represent significant sensi-

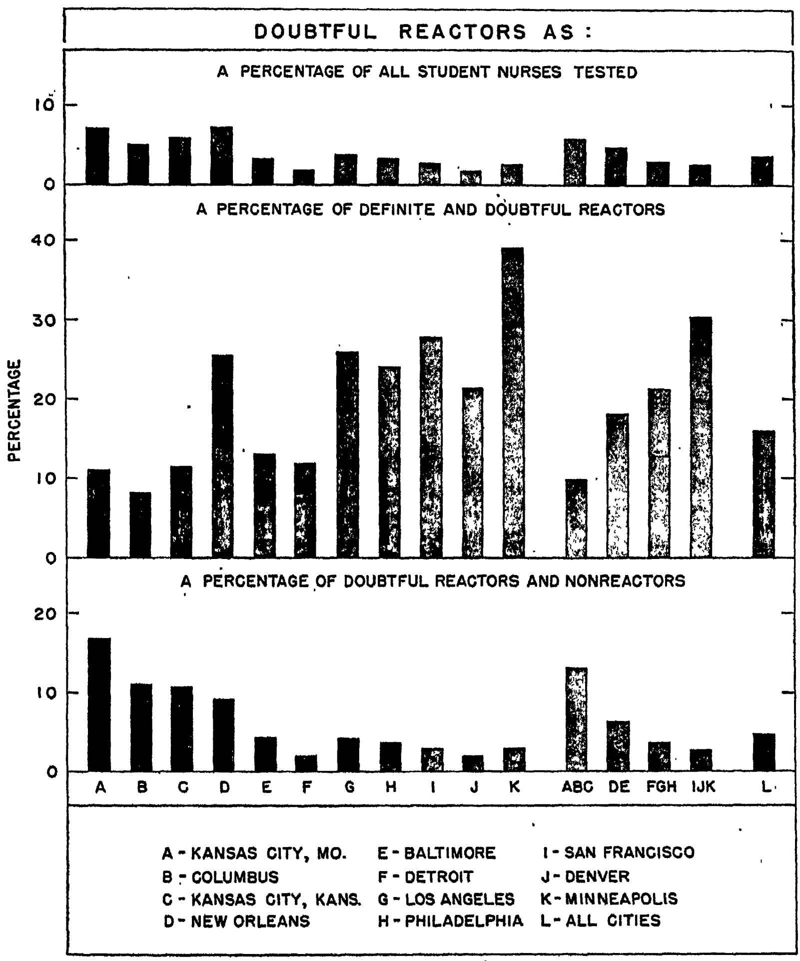


Figure 2. Doubtful histoplasmin reactors as percentages of all student nurses tested, of definite and doubtful histoplasmin reactors, and of doubtful histoplasmin reactors and nonreactors, among student nurses tested in specified cities and groups of cities.

tivity to histoplasmin, the variability in the frequency of doubtful histoplasmin reactions among nurses training in the different metropolitan areas is considered briefly. Figure 2 and table 2 show the frequency of doubtful histoplasmin reactions expressed in three different ways.

Table 2. *Doubtful histoplasmin reactors as percentages of all student nurses tested, of definite and doubtful histoplasmin reactors, and of doubtful histoplasmin reactors and nonreactors, among student nurses tested in specified cities*

City	Doubtful histoplasmin reactors as percentages of specified groups			Number of student nurses		
	Of all student nurses tested	Of definite and doubtful reactors	Of doubtful reactors and nonreactors	Definite reactors	Doubtful reactors	Total number tested
Individual Cities						
Kansas City, Mo	7.1	11.0	16.7	653	80	1,131
Columbus, Ohio	4.9	8.1	11.0	740	65	1,330
Kansas City, Kans	5.8	11.4	10.7	241	31	532
New Orleans	7.2	25.4	9.1	273	93	1,290
Baltimore	3.3	13.0	4.2	434	65	1,971
Detroit	1.7	11.9	1.9	158	21	1,250
Los Angeles	3.7	25.9	4.1	189	65	1,778
Philadelphia	3.3	24.1	3.6	228	71	2,179
San Francisco	2.7	27.8	2.9	78	30	1,111
Denver	1.8	21.4	1.9	88	24	1,329
Minneapolis	2.7	39.1	2.8	101	65	2,419
Grouped Cities						
Columbus, Kansas City	5.9	9.8	13.0	1,634	176	2,993
Baltimore, New Orleans	4.8	18.1	6.2	707	158	3,261
Detroit, Los Angeles, Philadelphia	3.0	21.3	3.4	575	157	5,207
Denver, Minneapolis, San Francisco	2.4	30.4	2.6	267	119	4,859
All cities	3.7	15.9	4.6	3,183	610	16,320

The upper section of the graph gives the simple percentage of doubtful reactors among the total group of nurses tested in each city and for the four groups of cities. Viewed in this way, there is, with some fluctuation, a decrease in the percentages of doubtful reactors as the total frequency of histoplasmin sensitivity decreases. The middle section of figure 2 gives the percentage of doubtful reactions among those nurses who give either a definite or a doubtful reaction; in other words, the proportion of those who give any reaction, and who have only that type of reaction which we have categorized as doubtful. So expressed, it is evident that doubtful reactions constitute an increasing proportion of all reactions, as the total frequency declines. In the grouped cities of Kansas City and Columbus, only about 10 percent of those who react give a doubtful reaction; in Denver, Minneapolis, and San Francisco, where only a small proportion of the nurses give any reaction, approximately 30 percent are indefinite or doubtful in character. In the lower section of the figure, doubtful reactors are expressed as percentages of those who do not have definite reactions. With but two exceptions, Detroit and Denver, this

proportion for the student nurses in the individual cities decreases from 16.7 percent in Kansas City, Mo., to 2.8 in Minneapolis, a trend similar to that noted for all histoplasmin reactors in these arrayed cities.

Presentation of the doubtful reactions in these several ways does not lead to a simple explanation of the variations observed in the different areas. It cannot be shown that the doubtful reactors are a constant percentage of the total group tested, of all reactors, or of those who do not have definite reactions. Further study of the meaning of doubtful histoplasmin reactions is in progress, but at present it is possible only to indicate that the observed variation is to some extent related to the level of histoplasmin sensitivity.

In the material which follows in this report, definite and doubtful histoplasmin reactors are either combined into a single group, identified simply as histoplasmin reactors, or the analysis is made separately for the two different categories of reactors.

Histoplasmin and Tuberculin Reactions and Pulmonary Calcification by Metropolitan Area

Table 3 and figure 3 show the percentages of histoplasmin reactors (definite and doubtful combined), together with the corresponding percentages of persons having pulmonary calcification and of those having definite tuberculin reaction, for the nurses tested in each of the 11 cities. In contrast with the over-all histoplasmin rate of 23.2

Table 3. *Number and percentage of definite and doubtful histoplasmin reactors, of persons with pulmonary calcification, and of definite tuberculin reactors, among student nurses tested in specified cities*

City	Percentage			Number of student nurses			
	Definite and doubtful histoplasmin reactors	Persons with pulmonary calcification	Definite tuberculin reactors	Definite and doubtful histoplasmin reactors	Persons with pulmonary calcification	Definite tuberculin reactors	Total number tested
Individual Cities							
Kansas City, Mo.	64.8	27.3	10.9	733	309	123	1,131
Columbus, Ohio	60.5	24.7	11.4	805	328	151	1,330
Kansas City, Kans.	51.1	18.2	13.7	272	97	73	532
New Orleans	28.4	9.3	13.3	366	120	171	1,290
Baltimore	25.3	11.3	17.9	499	222	353	1,971
Detroit	14.3	7.0	13.9	179	88	174	1,250
Los Angeles	14.3	5.0	18.7	254	89	333	1,778
Philadelphia	13.7	5.3	22.8	209	115	497	2,179
San Francisco	9.7	4.1	18.6	108	46	207	1,111
Denver	8.4	5.5	18.8	112	73	250	1,329
Minneapolis	6.9	2.6	7.9	166	63	192	2,419
Grouped Cities							
Columbus, Kansas City	60.5	24.5	11.6	1,810	734	347	2,993
Baltimore, New Orleans	26.5	10.5	16.1	865	342	524	3,261
Detroit, Los Angeles, Philadelphia	14.1	5.6	19.3	732	292	1,004	5,207
Denver, Minneapolis, San Francisco	7.9	3.7	13.4	386	182	649	4,859
All cities	23.2	9.5	15.5	3,793	1,550	2,524	16,320

percent, only 9.5 percent of all the nurses have pulmonary calcification, and 15.5 percent have definite reactions to tuberculin.

In the different cities the frequency of definite tuberculin reactors ranges from a high of 22.8 percent in Philadelphia, to a low of 7.9 percent in Minneapolis. Other cities showing relatively high rates of tuberculin reactors include Denver, San Francisco, and Los Angeles. Relatively low rates are found in Kansas City, Mo., and Columbus. It should be noted that the range of tuberculin reactor rates is relatively limited, in comparison with the rates for histoplasmin reactors.

The frequency of pulmonary calcification among nurses in the

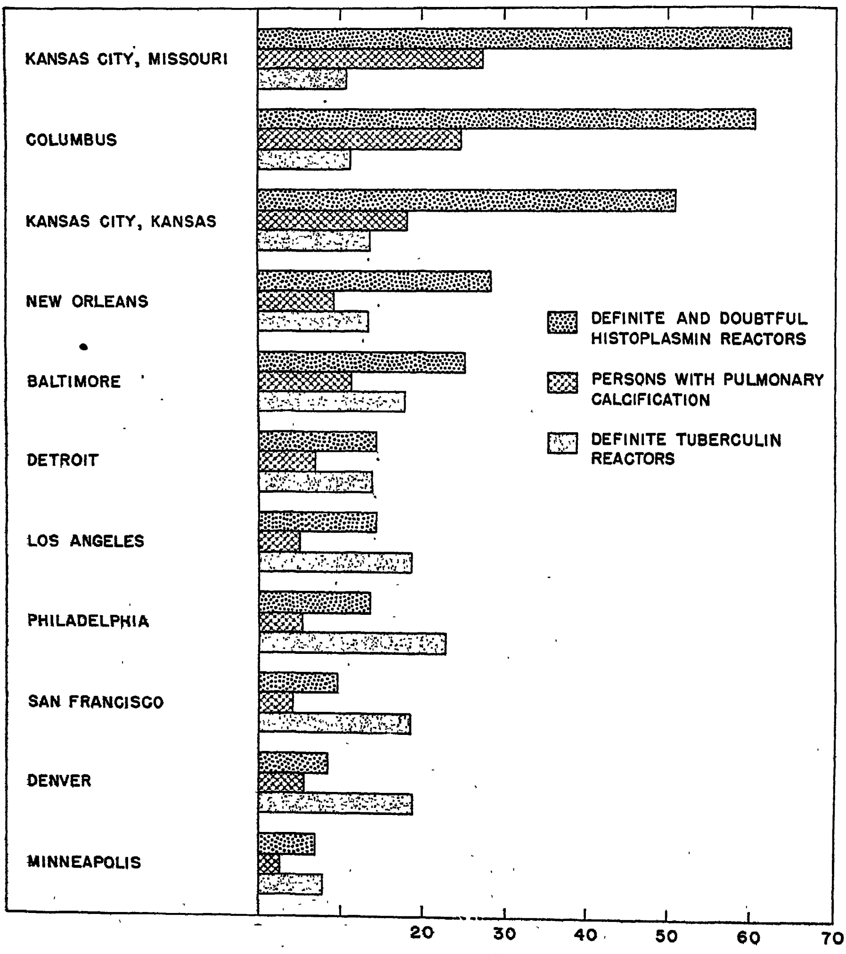


Figure 3. Percentage of definite or doubtful histoplasmin reactors, of persons with pulmonary calcification, and of definite tuberculin reactors among student nurses tested in specified cities.

several metropolitan areas varies widely from the average of 9.5 percent for nurses in all cities. The highest rates are found in Kansas City and Columbus, where approximately one-fourth of all the nurses examined show calcification on their chest X-ray films. The lowest rate, 2.6 percent, is found in Minneapolis. Between these two extremes, the trend in the decrease of the percentage of nurses having calcification is similar to the trend of decrease in the percentage of histoplasmin reactors in the individual cities. With but two minor exceptions, in each test area the student nurses with a successively lower histoplasmin reactor rate have a successively lower rate of calcification. While the rate of pulmonary calcification among nurses in Baltimore is somewhat higher than in New Orleans, and in Denver is slightly higher than in Los Angeles, Philadelphia, and San Francisco, these differences are not statistically significant.

It should be noted also that, although the calcification rates do not approach the magnitude of the rates of histoplasmin reactors, the relative decrease in the percentage of student nurses with pulmonary calcification in the arrayed cities, is of comparable magnitude to the relative decrease in the rate of histoplasmin reactors.

It is interesting that in the comparison of the gross rates for tuberculin reactors and persons having pulmonary calcification, the correlation that would be expected between them is not apparent. One explanation for this is the limited range in variation of tuberculin reactors, compared to the wide range for histoplasmin reactors, from one metropolitan area to another. Further, as will be shown later, the frequency of calcification among reactors to histoplasmin only is about three times as great as the frequency among reactors to tuberculin only.

Association of Pulmonary Calcification with Histoplasmin and Tuberculin Reactions

General Aspects

The best general summary of the relationship between pulmonary calcification and tuberculin and histoplasmin sensitivity may be made from the material of the present study simply by showing the frequency of calcification in four groups of nurses: (*a*) Those who react to both antigens (H+, T+), (*b*) those who react to histoplasmin but not to tuberculin (H+, T−), (*c*) those who react to tuberculin but not to histoplasmin (H−, T+), and (*d*) those who do not react to either antigen (H−, T−). As classified for present purposes of summarizing results, histoplasmin reactors (H+) are those who are categorized as having either a definite or a doubtful reaction to histoplasmin, while tuberculin reactors (T+) are only those categorized as definite reactors (those showing at least 5 mm. of definite induration to the first

or 0.0001 mg. dose of PPD–S). Nurses classified here as (H—) represent only those who are categorized as nonreactors to histoplasmin; nurses classified as (T—) include the three categories designated as questionable reactors, essentially nonreactors, and nonreactors. The frequency of calcification in these four groups of nurses is as follows:

Reaction group	*Percentage of nurses with calcification*	*Number of nurses with calcification*	*Number of nurses tested*
H+ T+	35.0	219	626
H+ T−	33.2	1,052	3,167
H− T+	10.7	203	1,898
H− T−	0.7	76	10,629

The extent to which the presence of pulmonary calcification is dependent upon sensitivity to either histoplasmin or tuberculin is strikingly brought out in the four percentage figures given above. Unless a nurse reacts to one or both antigens she has only 7 chances in a thousand of having pulmonary calcification; if she reacts only to tuberculin her chances are about 1 in 10; if she reacts to histoplasmin or to both histoplasmin and tuberculin, her chances are about 1 in 3.

Certain aspects and implications of these findings warrant emphasis and detailed consideration. Attention may be directed first to the large number of cases on which the rates are based and therefore to their relative stability. Moreover, the reliability of the rates is greatly strengthened by the uniformity in techniques and interpretations which it was possible to attain in the field work. The fact that the population under study is from widely separated geographic areas in the country points to the representativeness of the findings. If over 10,000 student nurses who are not reactors to either tuberculin or histoplasmin show a pulmonary calcification rate of less than 1 percent, that finding can be considered as reasonably well established and generally applicable to young white women in the country as a whole. Further, the finding of such a low frequency of calcification, only 0.7 percent, is evidence that pulmonary calcification unassociated with tuberculin or histoplasmin sensitivity constitutes a relatively minor problem. In other words, *calcification associated with conditions which do not also produce sensitivity to tuberculin or to histoplasmin, at least in the areas covered in this study, must occur relatively infrequently.*

The difference in the frequency of calcification in nurses who react to one antigen but not to the other, is striking: pulmonary calcification in histoplasmin reactors is over three times as frequent as it is in tuberculin reactors—33.2 percent as compared with 10.7 percent.

The frequency of calcification in nurses who react to both histoplasmin and tuberculin, 35.0 percent, is only slightly higher than it is in those who react only to histoplasmin, 33.2 percent. This finding is somewhat unexpected, on theoretical grounds at least, since reactors to both antigens might be expected to show a rate equal to the inde-

pendent probabilities of two chances of having pulmonary calcification, one chance associated with tuberculin and the other with histoplasmin sensitivity. If such were the case, reactors to both antigens would have had a calcification rate of 40.3 percent which is considerably more than the observed one of 35.0 percent.

Variation According to Levels of Sensitivity

Presentation in summary form of the relationships between pulmonary calcification and sensitivity to tuberculin and to histoplasmin furnishes only the bare elements of a basic pattern and in some respects gives an oversimplified description of the association among the three variables. In order to provide further significant details, table 4 and figure 4 show the same data except that here reactors to the two antigens are subdivided into the categories which are described in the section, Source and Character of Data. With respect to histoplasmin, three groups are used: definite reactors, doubtful reactors, and nonreactors. With respect to tuberculin, four groups are used: definite reactors, questionable reactors, essentially nonreactors, and nonreactors. Classification of the total group of 16,320 nurses according to their reactions to both tuberculin and histoplasmin furnishes 12 subgroups, and for each of these the frequency of pulmonary calcification is given in table 4. Figure 4 shows in three-dimensional graphic form the calcification rates for the 12 subgroups. For purposes of orientation it may be noted that the last column on

Table 4. *Number and percentage of student nurses with pulmonary calcification according to histoplasmin and to tuberculin reactions*

Tuberculin reaction	Histoplasmin reaction: Definite reactors	Doubtful reactors	Nonreactors	Total
PERCENTAGE OF STUDENT NURSES WITH PULMONARY CALCIFICATION				
Definite reactors	38.7	21.9	10.7	16.7
Questionable reactors	30.1	15.4	1.6	7.5
Essentially nonreactors	35.3	16.5	0.6	8.4
Nonreactors	38.7	16.0	0.7	8.0
Total	36.6	17.5	2.2	9.5
NUMBER OF STUDENT NURSES WITH PULMONARY CALCIFICATION				
Definite reactors	189	30	203	422
Questionable reactors	50	4	11	65
Essentially nonreactors	555	47	36	638
Nonreactors	370	26	29	425
Total	1,164	107	279	1,550
NUMBER OF STUDENT NURSES TESTED				
Definite reactors	489	137	1,898	2,524
Questionable reactors	166	26	675	867
Essentially nonreactors	1,571	285	5,759	7,615
Nonreactors	957	162	4,195	5,314
Total	3,183	610	12,527	16,320

the right in the front row, labeled 10.7, indicates that 10.7 percent of nurses who are definite reactors to tuberculin and nonreactors to histoplasmin show pulmonary calcification in their chest films. This group is the only one shown separately in this tabulation which corresponds exactly with one of the groups discussed in the summary review of the relationship between calcification and sensitivity to the two antigens. All of the other upright bars shows graphically the relative frequency of calcification in the various other subgroups in which the nurses have been classified for the present description.

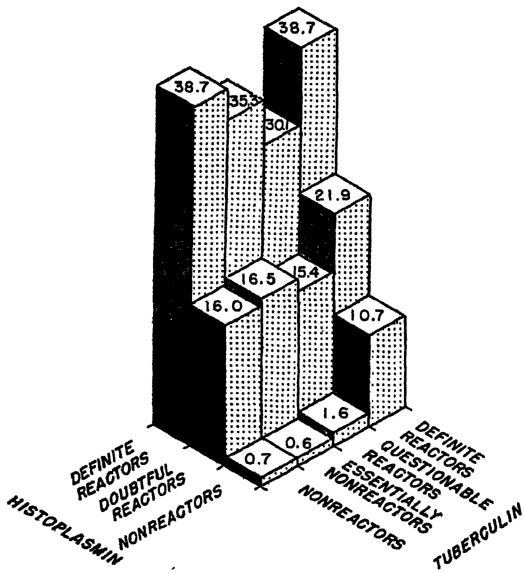


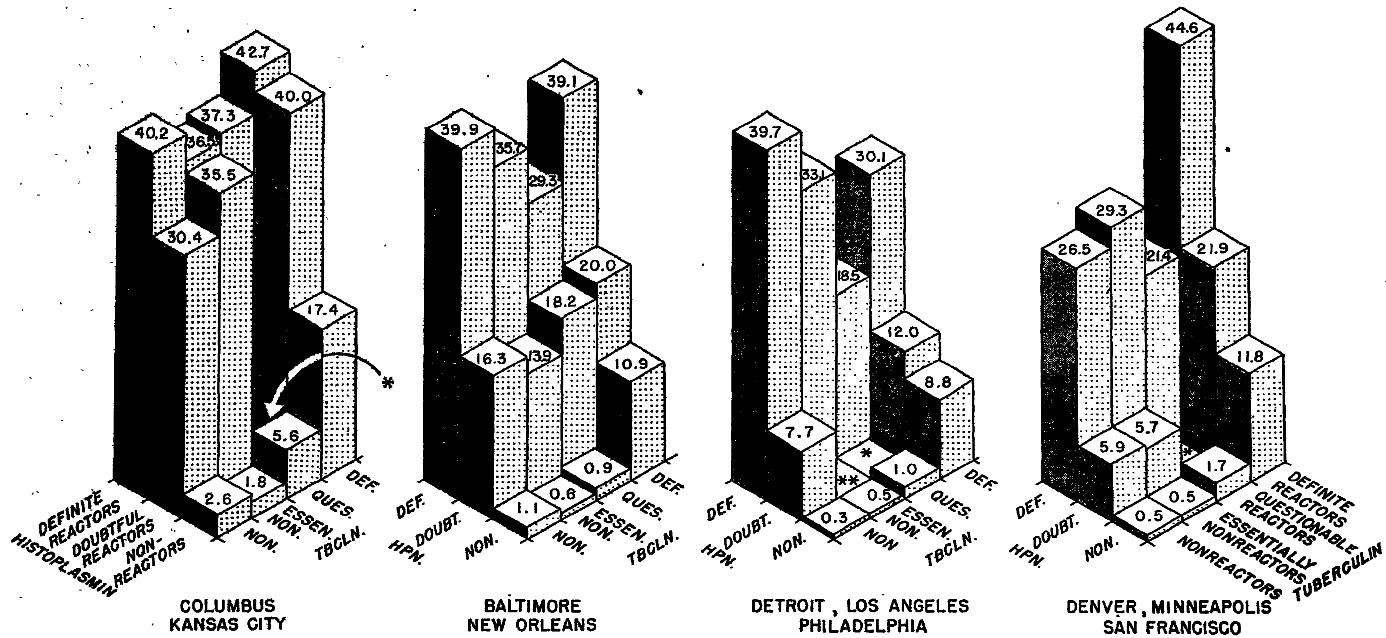
Figure 4. Percentage of student nurses with pulmonary calcification, according to histoplasmin and to tuberculin reactions.

A number of significant details are brought out in figure 4. First, considering the front row of columns to the right, which give calcification rates for different categories of tuberculin reactors among histoplasmin nonreactors, it is apparent that very low rates prevail except for the definite tuberculin reactors. Among the nonreactors and essentially nonreactors the rates are less than 1 percent, 0.7 and 0.6 percent, respectively, for these two groups. The calcification rate for the questionable reactors is only 1.6 percent, which may represent an unexpected finding to many readers when it is recalled that this group constitutes one which would be designated by many workers in the tuberculosis field as definite, or even strong, "second dose" tuberculin reactors. By definition, this group contains nurses who showed 10 or more mm. of firm induration (our qualitative descriptive classes I and II) to the 0.005 mg. dose of PPD–S. The frequency of

calcification in this group, compared with that in definite tuberculin reactors, 10.7 percent, has very important implications with regard to questions of the specificity of the tuberculin test. It must be apparent, at least for the purposes of selecting persons with tuberculous pulmonary calcification, that even strong reactors to the second dose of 0.005 mg. of PPD-S show only a very slightly higher frequency of calcification than those who give no reaction or a very slight one to this dosage of tuberculin. This finding represents another addition to accumulating evidence which points quite directly to the fact that for *practical* tuberculosis work, at least in the United States, little is gained by testing with large doses of tuberculin.

Another interesting finding from figure 4 is brought out by study of the frequency of calcification among doubtful histoplasmin reactors (shown as the middle row of bars). In a general way it is evident that the rate of calcification for the various groups of doubtful histoplasmin reactors approximates half of the rate for the definite histoplasmin reactors, and, further, that there are marked differences between the rates for doubtful reactors and those categorized as nonreactors to histoplasmin. For purposes of selecting cases showing that type of calcification which is associated with sensitivity to histoplasmin, it is evident that the point of separation between specific and nonspecific histoplasmin reactions is most efficiently made by designating our nonreactor group as "negative" and both our definite and doubtful reactors as "positive." According to our standards this would mean the allocation of all types of histoplasmin reactions to the "positive" group, except those which show only small areas of erythema of less than 5 mm. in diameter. This finding is obviously of significance, especially since in many of the reports on the relationship of pulmonary calcification and sensitivity to histoplasmin, reactions equivalent to those in our doubtful group have been classified as "negative." This practice may account, in part at least, for the findings of a higher rate of pulmonary calcification among nonreactors than is reported here and in our earlier paper on the subject.

The final observation to be made on the material presented in figure 4 concerns the variation in rates of pulmonary calcification among the various groups of definite histoplasmin reactors (shown as the back row of bars). A curious and unexpected type of variation in calcification rates appears in this group when the nurses are subdivided according to sensitivity to tuberculin. Again, as was noted in the summary analysis of the relationships of the three variables, the frequency of calcification in nurses who are definite reactors to both antigens is less than theoretically would be expected. Nonreactors and definite reactors to tuberculin have the same frequency of calcification, while those who show intermediate levels of tuberculin sensitivity have lower rates of calcification. These rates are not



* LESS THAN 10 PERSONS TESTED

**NO STUDENT NURSE WITH PULMONARY CALCIFICATION

Figure 5. Percentage of student nurses with pulmonary calcification, according to histoplasmin and tuberculin reactions, in specified groups of cities.

based on small numbers of nurses and it is evident that some undetermined factor must exist which affects the association between reactions to tuberculin and to histoplasmin and the development of pulmonary calcification. Further study of this point is now in progress.

Variation by Metropolitan Area

While there are great differences in the frequency of pulmonary calcification when the nurses are subdivided according to their reactions to tuberculin and histoplasmin, it is of interest to determine whether the pattern of these differences varies with geographic area. Unfortunately, the number of nurses under observation in the separate areas is not large, and this analysis has been limited to the groups of cities combined according to the varying levels of histoplasmin sensitivity. The data assembled in the appendix table and shown in figure 5 in the form of three-dimensional graphs, give the results for the four groups of cities. Comparison of the four graphs in figure 5 with the one for all cities shown in figure 4 indicates that there is no great divergence from the general basic pattern of the relationship between pulmonary calcification and sensitivity to tuberculin and histoplasmin, especially when allowance is made for variations due to the small number of cases on which many of the rates in figure 5 are based. On the other hand, some significant differences among the four groups of cities are evident.

First, there is a tendency for the rates of pulmonary calcification to be high in cities where histoplasmin reactors are frequent and low where they are infrequent. In spite of minor fluctuations, the greatest contrast may be observed in the left hand compared with the right hand graph in figure 5. In Columbus and Kansas City, the calcification rates are substantially greater in every subgroup, except one, than in the group of cities composed of Denver, Minneapolis, and San Francisco. A visual impression of the extent of the difference is particularly brought out by the height of the "back" row of bars, those representing definite histoplasmin reactors, where the frequency of calcification in Kansas City and Columbus approaches twice that in Denver, Minneapolis, and San Francisco.

Second, in the four groups of cities, there are quite marked differences in calcification rates for nurses who have histoplasmin reactions categorized as doubtful. In Kansas City and Columbus, the frequency of pulmonary calcification among doubtful histoplasmin reactors is almost as great as among definite reactors. In contrast with this, among nurses in Denver, Minneapolis, and San Francisco, the doubtful reactors tend to have low rates of calcification both as compared with their own schoolmates who have definite histoplasmin reactions, and as compared with doubtful reactors in Kansas City and

Columbus. Although there are fluctuations in the rates, the intermediate groups of cities show intermediate rates of calcification.

A third point which warrants particular comment is the relatively high rate of calcification among nurses in Kansas City and Columbus who are nonreactors to histoplasmin, especially those who are not definite reactors to tuberculin. The frequency of calcification in the latter group is several times greater than for nurses with comparable skin-test results in the other groups of cities.

Histoplasmin and Tuberculin Reactions in Nurses With Pulmonary Calcification

In the preceding section of this paper, the relationship between pulmonary calcification and sensitivity to tuberculin and histoplasmin has been described in terms of relative frequencies, or chances of finding calcification in the chest film of a nurse if the results of her skin tests are known. These chances, within broad limits, were shown to be roughly similar, regardless of the general prevalence of tuberculin or histoplasmin reactors in the area in which the nurses were observed. Presentation of the findings of the study in such form would appear to be adequate for showing the dependence of pulmonary calcification upon sensitivity to tuberculin and histoplasmin.

From the practical side, however, the results of skin tests and X-ray findings may be viewed in a quite different way. The practicing physician or roentgenologist who deals, not with whole population groups, but with cases showing various types of deviation from the normal, may be less concerned with calcification rates among the various reactor groups in the population, than with the frequency of tuberculin and histoplasmin reactions *among his observed cases of calcification*. The material of the present study is presented in this section, therefore, in terms of the distribution of skin-test results among nurses who have pulmonary calcification, particularly to show the variation which occurs in different parts of the country.

Among the total group of over 16,000 nurses studied, 1,550 were found to have shadows interpreted as definite and/or probable pulmonary calcification on their chest films. In table 5 and figure 6, this special group of nurses is classified according to sensitivity to tuberculin and histoplasmin in the four broad groups consisting of reactors and nonreactors to each antigen.

Among the 1,550 nurses, reactors to histoplasmin alone account for 1,052 nurses; reactors to both antigens for 219; reactors to tuberculin alone for 203; and nonreactors to both antigens for 76. In percentage terms, the frequencies are 68, 14, 13, and 5, respectively. Considering the total frequency of reactors to each antigen, 82 percent of the nurses having calcification reacted to histoplasmin and 27 percent, to tuberculin.

Table 5. *Number and percentage of histoplasmin reactors, of reactors to both histoplasmin and tuberculin, of tuberculin reactors, and of nonreactors to both antigens, among 1,550 student nurses with pulmonary calcification in specified cities*

City	Histoplasmin reactors, tuberculin nonreactors (H+, T−)	Histoplasmin reactors, tuberculin reactors (H+, T+)	Histoplasmin nonreactors, tuberculin reactors (H−, T+)	Histoplasmin nonreactors tuberculin nonreactors (H−, T−)	Total number of student nurses with pulmonary calcification
PERCENTAGE DISTRIBUTION OF SPECIFIED REACTORS AMONG STUDENT NURSES WITH PULMONARY CALCIFICATION					
Kansas City, Mo	82.2	12.0	1.6	4.2	100.0
Columbus, Ohio	83.2	11.0	3.4	2.4	100.0
Kansas City, Kans	71.1	18.5	7.2	3.1	100.0
New Orleans	77.5	13.3	5.8	3.3	100.0
Baltimore	64.0	15.3	15.8	5.0	100.0
Detroit	67.0	10.2	21.6	1.1	100.0
Los Angeles	50.6	18.0	22.5	9.0	100.0
Philadelphia	47.0	18.3	28.7	6.1	100.0
San Francisco	32.6	17.4	39.1	10.9	100.0
Denver	37.0	15.1	41.1	6.8	100.0
Minneapolis	33.3	20.6	28.6	17.5	100.0
All cities	67.9	14.1	13.1	4.9	100.0
NUMBER OF SPECIFIED REACTORS AMONG STUDENT NURSES WITH PULMONARY CALCIFICATION					
Kansas City, Mo	254	37	5	13	309
Columbus, Ohio	273	36	11	8	328
Kansas City, Kans	69	18	7	3	97
New Orleans	93	16	7	4	120
Baltimore	142	34	35	11	222
Detroit	59	9	19	1	88
Los Angeles	45	16	20	8	89
Philadelphia	54	21	33	7	115
San Francisco	15	8	18	5	46
Denver	27	11	30	5	73
Minneapolis	21	13	18	11	63
All cities	1,052	210	203	76	1,550

The proportion of nurses with calcification accounted for by histoplasmin and by tuberculin sensitivity varies markedly in the different cities as would be expected. The relative importance of histoplasmin sensitivity in all areas is clearly shown. In 9 of the 11 cities, more histoplasmin than tuberculin reactors are observed among nurses with pulmonary calcification. The findings for Kansas City, Columbus, and New Orleans are particularly striking. In these cities, a tremendously high proportion of nurses have calcification associated with histoplasmin sensitivity, and only a very small proportion, with definite tuberculin sensitivity. As the cities are arrayed, there is a progressive decrease in the proportion reacting to histoplasmin, but even in San Francisco, Denver, and Minneapolis, where the prevalence of histoplasmin sensitivity is low, more than 50 percent of the calcification observed is associated with histoplasmin sensitivity.

The prevalence of tuberculin reactors among student nurses with pulmonary calcification is sharply contrasted with that of histoplasmin reactors in the different cities. With but minor exceptions,

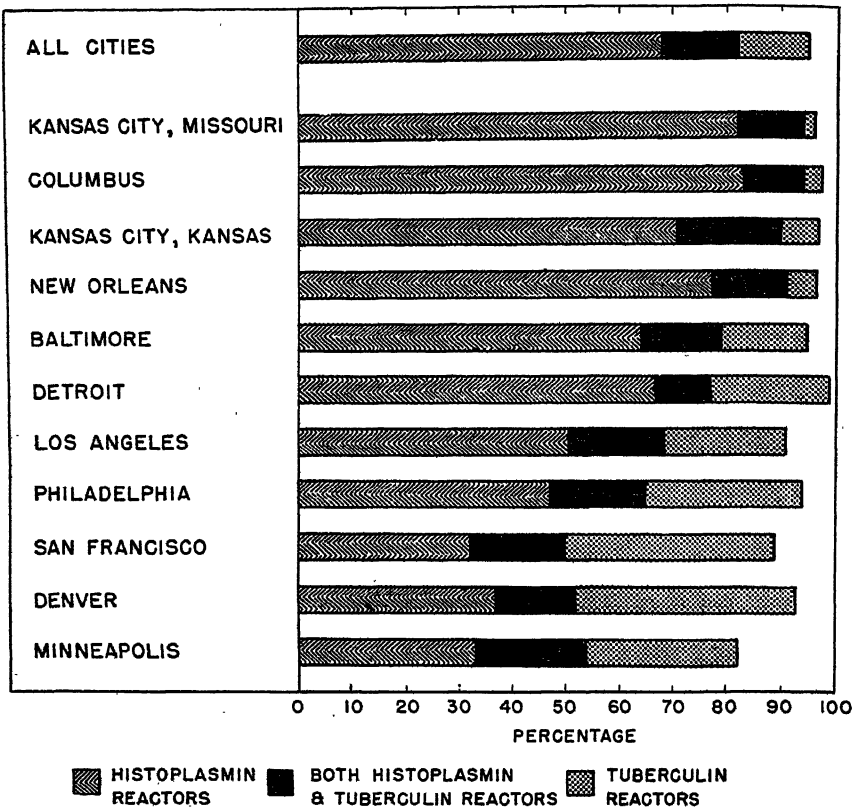


Figure 6. Percentage of definite or doubtful histoplasmin reactors, of both definite or doubtful histoplasmin and definite tuberculin reactors, and of definite tuberculin reactors among 1,550 student nurses with pulmonary calcification, in specified cities.

the prevalence of definite tuberculin reactors begins in the arrayed cities at about 15 percent in Kansas City, Mo., and Columbus, and gradually increases to reach a maximum of about 55 percent in the last cities in the array. This finding is the obvious result, not of an increasing frequency of tuberculin reactors in the population of student nurses in the arrayed cities, but, a progressive decrease in the frequency of cases of calcification associated with histoplasmin sensitivity. Student nurses with pulmonary calcification who have neither reaction to histoplasmin nor definite reaction to tuberculin show a similar trend, increasing gradually in the arrayed cities from about 3 to nearly 20 percent.

Special attention is directed to the finding in Minneapolis of 11 out of 63 nurses (17.5 percent) who have calcification and who are not considered as being sensitive to either histoplasmin or tuberculin. This finding of 17.5 percent nonreactors among nurses with calcifica-

tion is in no way incompatible with the extremely close relationship demonstrated in this study between pulmonary calcification and sensitivity to tuberculin and histoplasmin. It merely reflects the sizable contribution to the total number of cases of calcification that is made by a very large nonreactor group in the population even though the calcification rate for that group is very small.

Summary

This paper is the fourth in a series of reports from a long term tuberculosis research program cooperatively undertaken in 1943 by the National Tuberculosis Association and the Public Health Service. The basic data consist of results of testing with tuberculin and histoplasmin, and observations on pulmonary calcification, on 16,320 student nurses in 76 nursing schools located in 10 metropolitan areas in the United States.

The frequency of reactors to histoplasmin varied from over 60 percent in Kansas City, Mo., and Columbus, Ohio, to less than 10 percent in San Francisco, Denver, and Minneapolis. Tuberculin reactors varied from 23 percent in Philadelphia to 8 percent in Minneapolis, while rates for pulmonary calcification were found above 20 percent in Kansas City, Mo., and Columbus and 5 percent or below in San Francisco, Los Angeles, and Minneapolis. Areas having high levels of frequency of pulmonary calcification corresponded with those having high rates of reactors to histoplasmin, and vice versa, indicating a gross association of the two variables.

Detailed analysis was made of the relationship between plumonary calcification and sensitivity to histoplasmin and tuberculin. About one-third of the nurses reacting to histoplasmin (or to both histoplasmin and tuberculin) had pulmonary calcification, about one-tenth of those reacting only to tuberculin had calcification, while only 0.7 percent with reaction to neither antigen had calcification. The basic pattern of this relationship remained essentially unchanged in different geographic areas of the study.

It was noted that calcification among reactors to histoplasmin alone was three times as high as among reactors to tuberculin alone. This factor, together with the higher average prevalence of histoplasmin as compared with tuberculin reactors, resulted in the finding that very much more calcification was observed associated with histoplasmin than with tuberculin sensitivity.

The extremely rare occurrence of calcification in nurses who did not react to either tuberculin or histoplasmin is considered strong presumptive evidence that tuberculosis, plus whatever causes sensitivity to histoplasmin, accounts for almost all roentgenologically observable pulmonary calcification in nurses in the areas studied.

The analysis of the material included an attempt to determine the levels of sensitivity to tuberculin and histoplasmin which would most efficiently and specifically select nurses who have pulmonary calcification. The results showed that tuberculin reactions, 5 or more mm. in diameter, of definite induration, to a dosage of 0.0001 mg. PPD-S would serve as a highly satisfactory definition of a specific tuberculin reaction. Results of testing with a larger dose of 0.005 mg. of PPD-S, whatever the size or description of the reaction, was of little assistance in selecting nurses with tuberculous pulmonary calcification. A specific histoplasmin reaction, on the other hand, was found to be induration of any size or of erythema of 5 or more mm. in diameter, to a 1/1000 dilution of the histoplasmin used in the study.

ACKNOWLEDGMENTS

Grateful acknowledgments are made to various members of the staff of the Field Studies Branch, particularly to Dr. Charlotte Silverman, Assistant Nurse Officer (R) Virginia S. Trevett, Dr. Henry Zwerling, Surgeon Eugene Gillespie, and Senior Surgeon Ira Lewis for their untiring work in the collection and interpretation of the original field data which are the basis for this report. We are indebted also to Mrs. Anne Sencindiver for preparation of the three dimensional graphic material.

The authors are especially indebted to the staffs of the participating schools of nurses. Only through their continued cooperation has the investigation been possible.

Invaluable assistance has been given by the Medical Research Committee of the National Tuberculosis Association through its support and sponsorship.

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APPENDIX

Number and percentage of student nurses with pulmonary calcification, according to histoplasmin and to tuberculin reaction, in specified cities throughout the United States

City	Tuberculin																			
	Definite reactors				Questionable reactors				Essentially nonreactors				Nonreactors				Total			
	Histoplasmin				Histoplasmin				Histoplasmin				Histoplasmin				Histoplasmin			
	Definite reactors	Doubtful reactors	Nonre-actors	Total	Definite reactors	Doubtful reactors	Nonre-actors	Total	Definite reactors	Doubtful reactors	Nonre-actors	Total	Definite reactors	Doubtful reactors	Nonre-actors	Total	Definite reactors	Doubtful reactors	Nonre-actors	Total
PERCENTAGE OF STUDENT NURSES WITH PULMONARY CALCIFICATION																				
Individual cities																				
Kansas City, Mo.	45.7	38.5	12.5	34.1	35.7	(*)	3.3	18.0	37.2	39.0	4.5	26.2	43.0	39.1	2.3	28.3	40.0	37.5	4.5	27.3
Columbus, Ohio	39.2	45.5	18.0	31.1	31.8	(*)	5.3	20.4	37.3	38.2	.7	22.7	41.5	23.5	3.4	26.4	38.6	35.4	3.6	24.7
Kansas City, Kans.	44.4	(*)	22.6	34.2	47.1	(*)	8.7	24.4	31.5	22.2	------	15.8	26.6	(*)	1.3	13.0	33.2	22.6	3.8	18.2
New Orleans	38.9	14.3	5.8	13.5	27.9	(*)	.7	8.1	40.1	13.5	.2	9.5	26.9	5.3	1.1	6.9	35.5	12.9	1.2	9.3
Baltimore	39.2	27.3	13.3	19.5	33.3	(*)	1.1	5.4	32.7	14.8	.8	9.0	45.2	25.0	1.1	13.1	37.6	20.0	3.1	11.3
Detroit	38.1	(*)	12.9	16.1	(*)	(*)	------	3.8	42.9	(*)	------	6.1	44.2	(*)	.2	5.2	41.8	9.5	1.9	7.0
Los Angeles	28.6	9.1	7.6	10.8	16.7	(*)	2.7	5.7	28.8	------	.7	3.6	37.5	5.3	.2	3.5	30.2	6.2	1.8	5.0
Philadelphia	28.6	13.6	8.0	10.9	(*)	(*)	------	1.0	27.8	------	.5	2.9	38.0	6.7	.5	4.8	31.1	5.6	2.1	5.3
San Francisco	38.9	(*)	9.8	12.6	(*)	(*)	7.1	6.8	14.8	7.7	.3	1.5	29.0	9.1	.2	2.4	25.6	10.0	2.3	4.1
Denver	39.1	20.0	13.8	16.4	(*)	(*)	------	4.4	48.3	9.1	.4	3.1	33.3	(*)	.7	2.6	39.8	12.5	2.9	5.5
Minneapolis	60.0	25.0	11.2	16.1	(*)	(*)	------	------	25.6	3.4	.5	1.5	20.0	5.0	.5	1.4	27.7	9.2	1.3	2.6
Grouped cities																				
Columbus, Kansas City	42.7	40.0	17.4	32.9	37.3	(*)	5.6	20.5	36.5	35.5	1.8	22.8	40.2	30.4	2.6	25.0	38.4	34.1	4.0	24.5
Baltimore, New Orleans	39.1	20.0	10.9	17.6	29.3	18.2	.9	7.1	35.7	13.9	.6	8.6	39.9	16.3	1.1	11.0	36.8	15.8	2.4	10.5
Detroit, Los Angeles, Philadelphia	30.1	12.0	8.8	11.8	18.5	(*)	1.0	3.4	33.1	------	.5	4.0	39.7	7.7	.3	4.5	33.7	6.4	2.0	5.6
Denver, Minneapolis, San Francisco	44.6	21.9	11.8	15.1	21.4	(*)	1.7	3.2	29.3	5.7	.5	1.9	26.5	5.9	.5	2.0	31.1	10.1	1.9	3.7
All cities	38.7	21.9	10.7	16.7	30.1	15.4	1.6	7.5	35.3	16.5	.6	8.4	38.7	16.0	.7	8.0	36.6	17.5	2.2	9.5
NUMBER OF STUDENT NURSES WITH PULMONARY CALCIFICATION																				
Individual cities																				
Kansas City, Mo.	32	5	5	42	10	0	1	11	127	16	9	152	92	9	3	104	261	30	18	309
Columbus, Ohio	31	5	11	47	7	1	1	9	155	13	2	170	93	4	5	102	286	23	19	328
Kansas City, Kans.	16	2	7	25	8	0	2	10	39	4	0	43	17	1	1	19	80	7	10	97
New Orleans	14	2	7	23	12	2	1	15	57	7	1	65	14	1	2	17	97	12	11	120
Baltimore	31	3	35	69	5	0	1	6	70	4	6	80	57	6	4	67	163	13	46	222
Detroit	8	1	19	28	2	0	0	2	33	0	0	33	23	1	1	25	66	2	20	88
Los Angeles	14	2	20	36	2	1	2	5	23	0	5	28	18	1	1	20	57	4	28	89
Philadelphia	18	3	33	54	1	0	0	1	22	0	4	26	30	1	3	34	71	4	40	115
San Francisco	7	1	18	26	0	0	3	3	4	1	1	6	9	1	1	11	20	3	23	46
Denver	9	2	30	41	3	0	0	3	14	1	2	17	9	0	3	12	35	3	35	73
Minneapolis	9	4	18	31	0	0	0	0	11	1	6	18	8	1	5	14	28	6	29	63

*Less than 10 persons tested.

Number and percentage of student nurses with pulmonary calcification, according to histoplasmin and to tuberculin reaction, in specified cities throughout the United States—Continued

City	Tuberculin: Definite reactors — Histoplasmin: Definite reactors	Doubtful reactors	Nonreactors	Total	Questionable reactors — Histoplasmin: Definite reactors	Doubtful reactors	Nonreactors	Total	Essentially nonreactors — Histoplasmin: Definite reactors	Doubtful reactors	Nonreactors	Total	Nonreactors — Histoplasmin: Definite reactors	Doubtful reactors	Nonreactors	Total	Total — Histoplasmin: Definite reactors	Doubtful reactors	Nonreactors	Total
NUMBER OF STUDENT NURSES WITH PULMONARY CALCIFICATION— Continued																				
Grouped cities																				
Columbus, Kansas City	79	12	23	114	25	1	4	30	321	33	11	365	202	14	9	225	627	60	47	734
Baltimore, New Orleans	45	5	42	92	17	2	2	21	127	11	7	145	71	7	6	84	260	25	57	342
Detroit, Los Angeles, Philadelphia	40	6	72	118	5	1	2	8	78	0	9	87	71	3	5	79	194	10	88	292
Denver, Minneapolis, San Francisco	25	7	66	98	3	0	3	6	29	3	9	41	26	2	9	37	83	12	87	182
All cities	189	30	203	422	50	4	11	65	555	47	36	638	370	26	29	425	1,164	107	279	1,550
NUMBER OF STUDENT NURSES TESTED																				
Individual cities																				
Kansas City, Mo	70	13	40	123	28	3	30	61	341	41	198	580	214	23	130	367	653	80	398	1,131
Columbus, Ohio	79	11	61	151	22	3	19	44	415	34	299	748	224	17	146	387	740	65	525	1,330
Kansas City, Kans	36	6	31	73	17	1	23	41	124	18	130	272	64	6	76	146	241	31	260	532
New Orleans	36	14	121	171	43	8	134	185	142	52	492	686	52	19	177	248	273	93	924	1,290
Baltimore	79	11	263	353	15	3	94	112	214	27	752	893	126	24	363	513	434	65	1,472	1,971
Detroit	21	6	147	174	8	1	43	52	77	9	453	539	52	5	428	485	158	21	1,071	1,250
Los Angeles	49	22	262	333	12	3	73	88	80	21	680	781	48	19	509	576	189	65	1,524	1,778
Philadelphia	63	22	412	497	7	4	87	98	79	30	773	882	79	15	608	702	228	71	1,880	2,179
San Francisco	18	6	183	207	2	0	42	44	27	13	361	401	31	11	417	459	78	30	1,003	1,111
Denver	23	10	217	250	9	0	59	68	29	11	510	550	27	3	431	461	88	24	1,217	1,329
Minneapolis	15	16	161	192	3	0	71	74	43	29	1,111	1,183	40	20	910	970	101	65	2,253	2,419
Grouped cities																				
Columbus, Kansas City	185	30	132	347	67	7	72	146	880	93	627	1,600	502	46	352	900	1,634	176	1,183	2,993
Baltimore, New Orleans	115	25	384	524	58	11	228	297	356	79	1,244	1,679	178	43	540	761	707	158	2,396	3,261
Detroit, Los Angeles, Philadelphia	133	50	821	1,004	27	8	203	238	236	60	1,906	2,202	179	39	1,545	1,763	575	157	4,475	5,207
Denver, Minneapolis, San Francisco	56	32	561	649	14	0	172	186	99	53	1,982	2,134	98	34	1,758	1,890	267	119	4,473	4,859
All cities	489	137	1,898	2,524	166	26	675	867	1,571	285	5,759	7,615	957	162	4,195	5,314	3,183	610	12,527	16,320

Characteristics of Commercial X-Ray Screens and Films—VII

By Willard W. Van Allen, B. Sc.*

This is the seventh in a series of reports on the characteristics of commercial X-ray film-screen-developer combinations. The following tables represent the accumulated and revised findings of the Electronics Laboratory to date. An earlier issue of this journal [1] described the technical details of this investigation.

Table 1. *Speed of fluoroscopic screen-film-developer combinations* [1] [2]

Film and developer [3]	Screens								
	D sample 1	D sample 2	D sample 3	666D sample 1	666D sample 2	E–2	B sample 1	B sample 2	B–2
Ansco Fluorapid:									
Eastman X-ray	120	150	155	100	125	------	------	------	------
Ansco Liquadol	105	125	140	75	100	------	------	------	------
G. E. Supermix	155	170	200	100	130	------	------	------	------
Eastman Rapid	135	145	165	85	110	------	------	------	------
DuPont Fluorofilm:									
Eastman X-ray	95	115	130	80	100	------	------	------	------
Ansco Liquadol	90	110	120	65	85	------	------	------	------
G. E. Supermix	130	145	165	90	110	------	------	------	------
Eastman Rapid	100	110	125	65	85	------	------	------	------
Eastman Blue Photoflure:									
Eastman X-ray	95	115	130	75	100	------	------	------	------
Ansco Liquadol	85	105	115	65	85	------	------	------	------
G. E. Supermix	110	120	145	75	95	------	------	------	------
Eastman Rapid	105	110	130	75	90	------	------	------	------
Eastman Green Photoflure:									
Eastman X-ray	------	------	------	------	------	140	60	70	95
Ansco Liquadol	------	------	------	------	------	120	55	55	85
G. E. Supermix	------	------	------	------	------	155	75	75	110
Eastman Rapid	------	------	------	------	------	115	50	55	80

[1] Speeds determined with film and screen in direct contact and therefore do not represent overall speed of the same combinations when used in a photofluorograph.
[2] Subsequent reports will contain data on additional developers used in combination with the films and screens shown in this table. These will include: Eastman Liquid X-ray, Buck X-ray, Dupont X-ray.
[3] Development time (as recommended by the manufacturer of the developer): Eastman X-ray Developer, 8 minutes; Ansco Liquadol, 4 minutes; G. E. Supermix, 8 minutes; Eastman Rapid, 8 minutes except for Green Photoflure, 7 minutes. All developments at 68° F.

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[1] Pub. Health Rep. 64: 430 (1949).

Table 2. *Speed of intensifying screen-film-developer combinations* [1]

Film and developer [2]	Screens								
	Buck			Eastman			Patterson		
	Xtra Speed	Mid-speed	Definition	Ultra speed	Fine Grain	Definition	High Speed	Par-speed	Detail
Ansco High Speed: [3]									
Ansco Liquadol	70	60	50	110	85	60	115	60	20
G. E. Supermix	75	60	50	110	85	60	115	65	20
Eastman Rapid	65	55	45	100	75	55	100	55	20
Dupont No. 508:									
Eastman X-ray	55	50	40	90	70	50	80	55	20
Ansco Liquadol	50	45	40	85	65	45	85	50	15
G. E. Supermix	55	45	40	80	65	45	80	50	15
Eastman Rapid	45	40	30	65	55	40	65	40	15
Eastman Blue Brand:									
Eastman X-ray	85	70	60	140	110	80	120	90	25
Ansco Liquadol	90	75	65	145	110	75	130	80	25
G. E. Supermix	90	75	65	145	105	75	135	80	25
Eastman Rapid	75	65	55	120	90	65	105	60	25

[1] Subsequent reports will contain data on additional developers used in combination with the films and screens shown in this table. These will include: Eastman Liquid X-ray, Buck X-ray, DuPont X-ray.
[2] Development time (as recommended by the manufacturer of the developer): Eastman X-ray Developer, 4½ minutes; Ansco Liquadol, 3 minutes; G. E. Supermix, 3 minutes; Eastman Rapid, 3½ minutes. All development at 68° F.
[3] Test with Eastman X-ray developer to be reported in a subsequent issue.

Table 3. *Average value of fog and contrast (gamma)* [1]

Film	Fog densities				Contrast (gamma)			
	Developer [2]				Developer [2]			
	Eastman X-ray	Ansco Liquadol	G. E. Supermix	Eastman Rapid	Eastman X-ray	Ansco Liquadol	G. E. Supermix	Eastman Rapid
Photofluorographic:								
Ansco Fluorapid	0.08	0.09	0.23	0.12	2.1	1.8	2.1	2.0
DuPont Fluorofilm	.21	.15	.40	.20	1.9	2.0	2.1	1.9
Eastman Blue Photoflure	.07	.04	.09	.05	1.8	1.8	1.9	1.7
Eastman Green Photoflure	.10	.11	.28	.09	2.0	2.1	2.3	2.2
Roentgenographic:								
Ansco High Speed	--------	.10	.10	.04	--------	2.8	2.8	2.3
DuPont No. 508	.18	.20	.04	.04	2.6	2.7	2.6	2.2
Eastman Blue Brand	.06	.08	.06	.05	2.8	3.0	--------	3.2

[1] Values obtained with open-tank development and continuous mechanical agitation at 68° F.
[2] Development time as given in tables 1 and 2. Similar data for other developers will appear in subsequent issues.

NOTICE

The *Index of Hospitals and Sanatoria With Tuberculosis Beds in the United States and Territories as of January 1, 1949,* is now available. The new edition has been expanded to include tuberculosis beds in institutions operated by the Federal Government. The *Index* now shows the name, location, and number of tuberculosis beds for all hospitals which accept tuberculosis patients.

Address requests for this publication to: Scientific Publications Section, Division of Tuberculosis, Public Health Service, Washington 25, D. C.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDING JUNE 11, 1949

A total of 243 cases of poliomyelitis was reported for the current week, as compared with 139 last week, 219 for the corresponding week last year, and a 5-year (1944–48) median of 92. Of 15 States reporting currently more than 3 cases each, only California showed a decline. Texas reported the largest number (as well as more than half of the total net increase), 94 cases (last week 37, next earlier week 72). Other States reporting more than 5 cases are as follows (last week's figures in parentheses): Oklahoma 22 (19), Arkansas 12 (2), California 12 (15), Mississippi 11 (3), Massachusetts 7 (7), Alabama 7 (1), Louisiana 7 (1), Florida 6 (2). The total since March 19 (average week of seasonal low incidence) is 1,079, as compared with 1,097 for the same period last year and a 5-year median of 506.

The reported incidence of measles showed a net decline during the week from 17,967 last week to 16,813. Increases were reported in several States, the largest in New Jersey, from 1,214 to 2,146. Both current and cumulative totals are above the corresponding 5-year medians. The total for the year to date is 536,114, 5-year median (reported last year), 469,024.

Of 27 cases of Rocky Mountain spotted fever (5-year median 18, corresponding week last year 28), only 3 States (Virginia, Tennessee and Wyoming, 4 cases each) reported more than 2 cases each. Eight cases occurred in the Middle Atlantic and South Atlantic areas, 6 in the North Central, 5 in the East South Central and 8 in the Mountain area.

Of 86 cases of typhoid and paratyphoid fever (last week 52, 5-year median 80), only 2 States reported more than 5 cases—Georgia 17 (including 16 paratyphoid) and Texas 17 (including 7 paratyphoid).

During the week New York reported 2 cases of anthrax, and Mississippi 1 case of smallpox.

Deaths recorded during the week in 94 large cities in the United States totaled 9,025, as compared with 8,731 last week, 8,952 and 8,917, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,917. The total for the year to date is 220,069, as compared with 223,973 for the corresponding period last year. Infant deaths totaled 590, last week 611, 3-year median 681. The cumulative figure is 14,932, as compared with 15,710 for the corresponding period last year.

Telegraphic case reports from State health officers for week ended June 11, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	----	1	----	190	----	9	4	----	10	----	----	1	8	----
New Hampshire	----	----	1	15	----	----	----	----	----	----	----	----	----	----
Vermont	----	----	----	148	----	----	1	----	4	----	----	----	----	----
Massachusetts	8	----	----	292	2	----	7	----	114	----	----	----	110	1
Rhode Island	1	----	----	15	----	3	1	----	7	----	----	----	4	----
Connecticut	----	1	2	564	----	14	1	----	13	----	----	----	19	1
MIDDLE ATLANTIC														
New York	5	3	(e)	1,436	4	155	2	----	d 122	----	----	4	163	3
New Jersey	6	----	2	2,146	2	49	5	1	68	----	----	----	75	2
Pennsylvania	1	----	(e)	1,413	3	----	----	1	85	----	1	4	79	20
EAST NORTH CENTRAL														
Ohio	7	----	1	1,759	5	52	----	----	110	----	----	3	47	10
Indiana	3	1	1	159	1	4	4	2	8	----	----	----	10	23
Illinois	----	----	1	363	5	117	3	1	33	----	2	2	83	2
Michigan [a]	4	1	----	543	2	37	1	1	149	----	----	1	56	9
Wisconsin	1	2	1	2,210	----	4	1	----	51	----	----	----	52	----
WEST NORTH CENTRAL														
Minnesota	----	----	----	105	----	1	2	----	19	----	----	----	8	----
Iowa	----	----	----	70	1	1	5	----	5	----	----	----	6	9
Missouri	4	----	1	48	1	7	1	2	9	----	8	----	5	----
North Dakota	----	2	1	8	3	----	1	----	2	----	----	----	----	----
South Dakota	----	----	----	59	----	----	1	----	2	----	----	----	----	----
Nebraska	1	1	3	79	----	----	3	----	19	----	----	----	1	----
Kansas	1	----	----	113	----	6	3	----	8	----	----	----	2	1
SOUTH ATLANTIC														
Delaware	----	----	----	18	----	----	1	----	2	----	----	----	----	----
Maryland [a]	2	1	3	131	----	26	----	----	d 27	----	----	----	5	----
District of Columbia	----	----	----	20	----	9	1	----	5	----	----	1	2	----
Virginia	3	----	66	398	6	30	----	4	9	----	3	5	32	1
West Virginia	1	----	14	93	1	3	2	----	10	----	----	1	33	----
North Carolina	3	----	----	199	1	----	2	1	15	----	1	2	44	----
South Carolina	3	----	140	372	2	72	3	----	1	----	----	4	13	2
Georgia	2	----	----	149	----	11	4	1	10	----	1	17	----	8
Florida	2	----	1	233	3	7	6	----	6	----	----	1	2	----

EAST SOUTH CENTRAL														
Kentucky				64	2	10	1	1	9				16	11
Tennessee	1	1	5	106	4	25		4	6		1	1	3	
Alabama	1		45	96	1	36	7		4			4	3	8
Mississippi [a]	1		18	23		9	11		5	1		1	4	
WEST SOUTH CENTRAL														
Arkansas	2		11	212		19	12				8	4	20	1
Louisiana			4	79	2	33	7		5			3	2	3
Oklahoma			14	180	2	20	22		1			3	3	4
Texas	16	1	488	664	3	173	94		21		2	17	128	14
MOUNTAIN														
Montana	1		4	201				1	5		2			
Idaho				57		4	2	1	[d] 6				3	
Wyoming	1			6	1	2	1	4	2		4		3	
Colorado	3		10	90		12	1	2	3				2	2
New Mexico			3	65		18	1		6			1		
Arizona			40	85		14			4			1	5	
Utah [a]				66		2	2		1				34	
Nevada														
PACIFIC														
Washington	1			213	2	2	4		23				8	
Oregon				110		17	1		1				24	
California	24	1	16	1,148		32	12		[d] 69			5	99	4
Total	109	16	896	16,813	59	1,045	243	27	1,094	1	33	86	1,216	
Median, 1944-48	154	7	676	14,112	93		92	18	2,213	3	19	80	1,886	
Year to date 23 weeks	3,440	233	72,540	536,114	1,841	47,152	2,003	155	54,591	40	563	1,082	23,692	
Median, 1944-48	5,709	200	186,516	469,024	3,701		1,004	104	77,487	224	400	1,268	46,339	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32d) Aug. 14	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	8,554		108,810	588,507	2,685		1,079		77,289	50		622	33,725	
Median, 1943-48 [b]	13,275		330,606	503,970	5,205		506		116,058	307		777	77,605	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for poliomyelitis and typhoid fever the corresponding periods are 1944-1945 to 1948-49, inclusive.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately, as follows: Maine 1; New York 2; Virginia 1; Georgia 16; Louisiana 1; Texas 7; California 1. Cases reported as salmonella infecton, not included, were as follows: New York 2; Pennsylvania 1.
[1] Corrections.—Delayed reports: Poliomyelitis, Arkansas 1 case (week ended March 12), Maryland 2 cases (May onset); Rocky Mountain spotted fever, Maryland 5 cases (May onset); paratyphoid fever, Maryland 1 case (March onset). Deductions, smallpox, Michigan 2 cases (reported week ended May 28), North Carolina 1 case (week ended May 14).
Alaska: Measles 4; pneumonia 2.
Hawaii Territory: Measles 180; lobar pneumonia 1; poliomyelitis 1.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended May 21, 1949.—During the week ended May 21, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		10	1	204	378	36	82	41	109	861
Diphtheria				3	1					4
Dysentery, bacillary							1		1	2
German measles		40		379	62	14	46	52	15	608
Influenza		30			1	31	50			112
Measles		93	24	245	236	232	148	473	243	1,694
Meningitis, meningococcal		1				2	1			4
Mumps		36	1	103	241	15	11	3	60	470
Poliomyelitis				1				1		2
Scarlet fever		9		78	58	1		9	10	165
Tuberculosis (all forms)		3	10	117	45	21	18	2	27	243
Typhoid and paratyphoid fever			1	15					3	19
Undulant fever					4					4
Venereal diseases:										
Gonorrhea	1	8	4	57	68	31	18	28	79	294
Syphilis		5	3	66	35	8	2	2	23	144
Whooping cough				60	11		26	1		98

MADAGASCAR

Notifiable diseases—April 1949.—Notifiable diseases were reported in Madagascar and Comoro Islands during April 1949 as follows:

Disease	April 1949			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi			2	0
Bilharziasis			99	0
Cerebrospinal meningitis			6	2
Diphtheria	1	0	1	1
Dysentery, amebic	31	0	292	3
Erysipelas			11	1
Influenza	73	0	3,707	37
Leprosy			44	0
Malaria	531	1	40,799	288
Measles	3	0	53	2
Mumps	1	0	99	0
Plague	1	0	11	10
Poliomyelitis			1	1
Pneumonia, broncho	4	2	224	55
Pneumonia, pneumococcic	2	0	254	51
Puerperal infection			1	0
Relapsing fever			6	0
Tuberculosis, pulmonary	5	1	72	18
Typhoid fever	4	0	18	3
Whooping cough	1	0	244	8

JAMAICA

Notifiable diseases—4 weeks ended May 28, 1949.—For the 4 weeks ended May 28, 1949, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities
Chickenpox	21	35
Diphtheria	3	1
Erysipelas	2	
Puerperal sepsis		2
Tuberculosis (pulmonary)	35	53
Typhoid fever	2	37

NEW ZEALAND

Notifiable diseases—5 weeks ended April 30, 1949.—During the 5 weeks ended April 30, 1949, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	4		Poliomyelitis	53	3
Diphtheria	16	4	Puerperal fever	2	
Dysentery:			Scarlet fever	119	1
Amebic	5		Tetanus	2	
Bacillary	14		Trachoma	3	
Erysipelas	14		Tuberculosis (all forms)	174	42
Food poisoning	7		Typhoid fever	10	
Lead poisoning	1		Undulant fever	4	
Malaria	1				

SWITZERLAND

Notifiable diseases—January–March 1949.—During the months of January, February, and March 1949, cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	January	February	March
Cerebrospinal meningitis	5	7	9
Chickenpox	421	340	457
Diphtheria	118	120	125
Dysentery		3	
Hepatitis, epidemic	61	38	27
Influenza	7,436	7,945	2,944
Measles	1,365	1,166	1,744
Mumps	253	341	406
Paratyphoid fever	6	10	6
Poliomyelitis	5	4	4
Scarlet fever	403	337	451
Tuberculosis	278	286	389
Typhoid fever	3	7	1
Undulant fever	17	24	16
Whooping cough	685	713	836

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma—Bassein.—Cholera has been reported in Bassein, Burma, as follows: Week ended May 14, 1949, 18 cases, 12 deaths; week ended May 21, 56 cases, 41 deaths.

Siam—Bangkok.—During the week ended May 21, 1949, two cases of cholera were reported in Bangkok, Siam.

Plague

India—Bombay.—During the week ended June 4, 1949, one fatal case of plague was reported in Bombay, India.

Java—Bandoeng.—During the week ended April 30, 1949, two cases of plague were reported in Bandoeng, Java.

Smallpox

Cuba—Habana.—On June 6, 1949, one case of smallpox was reported in the suburban area of Habana, Cuba.

French West Africa—Niger Territory.—Smallpox has been reported in Niger Territory, French West Africa, as follows: For the period April 1–30, 1949, 133 cases, 19 deaths; for the period May 1–20, 129 cases, 20 deaths.

Italy—Rome.—Information dated June 7, 1949, states that an outbreak in Rome of what was originally diagnosed as chickenpox is now regarded as smallpox. Since February, 90 cases with 3 deaths are reported to have occurred in the city.

Japan—Osaka.—During the period April 22–June 2, 1949, 52 cases of smallpox were reported in Osaka Region, Japan, including 20 cases in Osaka City.

Mozambique.—During the week ended April 30, 1949, 27 cases of smallpox, with 5 deaths, were reported in Quelimane Province, Mozambique.

Netherlands Indies:

Java—Batavia.—Smallpox has been reported in Batavia, Java, as follows: Week ended May 21, 1949, 297 cases, 29 deaths; week ended May 28, 240 cases, 35 deaths.

Riouw Archipelago—Selat Pandjang.—During the week ended May 21, 1949, two cases of smallpox were reported in Selat Pandjang in the Riouw Archipelago, Netherlands Indies.

Yellow Fever

No reports of yellow fever were received during the current week.

DEATHS DURING WEEK ENDED JUNE 4, 1949

	Week ended June 4, 1949	Correspond-ing week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,731	8,606
Median for 3 prior years	9,192	
Total deaths, first 22 weeks of year	211,044	215,021
Deaths under 1 year of age	611	661
Median for 3 prior years	661	
Deaths under 1 year of age, first 22 weeks of year	14,342	15,098
Data from industrial insurance companies:		
Policies in force	70,396,235	71,068,262
Number of death claims	10,152	9,621
Death claims per 1,000 policies in force, annual rate	7.5	7.1
Death claims per 1,000 policies, first 22 weeks of year, annual rate	9.6	10.1

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 JULY 8, 1949 NUMBER 27

IN THIS ISSUE

Filariasis Control by DDT Residual House Spraying
Salmonella Types in Maryland

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

CONTENTS

	Page
Filariasis control by DDT residual house spraying, Saint Croix, Virgin Islands:	
I. Operational Aspects. Charles E. Kohler	857
II. Results. H. W. Brown, and R. W. Williams	863
Salmonella types encountered in Maryland between 1944 and 1948. A. A. Hajna	876
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended June 18, 1949	878
Territories and possessions:	
Panama Canal Zone—Notifiable diseases—April 1949	881
Deaths during week ended June 11, 1949	881
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended May 28, 1949	882
Norway—Notifiable diseases—February 1949	882
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Cholera	883
Plague	883
Smallpox	883
Typhus fever	884
Yellow fever	884

Public Health Reports

Vol. 64 • JULY 8, 1949 • *No. 27*

Filariasis Control by DDT Residual House Spraying, Saint Croix, Virgin Islands

I. Operational Aspects

By Charles E. Kohler*

DDT applied as a residual spray has been used successfully for the control of adult *Anopheles* in malaria control programs in many parts of the world. Up to the present time, however, data on its effectiveness against mosquitoes of other genera have been scanty, and have been collected incidental to anopheline control work. Reeves, Washburn, and Hammon (*1*) reported results from the experimental spraying of natural resting places of *Culex tarsalis* in California. De Caires (*2*) indicated that control of *Aedes aegypti* was easily achieved by spraying houses with DDT in British Guiana but that *Culex quinquefasciatus* was far less susceptible to DDT. Giglioli (*3*) demonstrated that adult *Culex* are the most resistant to DDT of the species studied by the Malaria Service in British Guiana. This same author (*4*) reports that in British Guiana *A. aegypti* is at present under control by routine measures but that the control of *C. quinquefasciatus* (*fatigans*) presents a more difficult problem. The present work constitutes the first attempt to use DDT residual house spraying for the control of *C. quinquefasciatus* to prevent transmission of *Wuchereria bancrofti*, the causative organism of human filariasis in the Caribbean region.

This program was initiated on St. Croix, Virgin Islands, October 9, 1946, as a cooperative project of the School of Public Health of Columbia University, the Public Health Service, and the Municipal Health Department of St. Croix. During blood surveys conducted by Dr. H. W. Brown, and his associates of Columbia University, it was found that 13.3 percent of 1,311 children of school age had microfilariae of *W. bancrofti*. A concurrent mosquito dissection survey of 2,244 *C. quinquefasciatus* revealed that 7.9 percent were positive for *W. bancrofti* and 2.3 percent of 867 *A. aegypti* were positive. The accompanying report, Results, by Dr. H. W. Brown and Dr. Roger W. Williams gives detailed medical and entomological informa-

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tion with a discussion of the results and effectiveness of the program discussed here.

The island of St. Croix is located in the American tropics and is the largest of the American Virgin Islands group. It is approximately 21 miles long with a maximum width of 6 miles and a total area of about 84 square miles. The low east coast of the island receives only 20 to 30 inches of rain a year and is almost desert-like with cacti and other xerophytic vegetation predominating. The north coast with a mountain range culminating in Blue Mountain, 1,099 feet above sea level, has 60 or more inches of rain a year. The average rainfall for the island varies from 30 to 60 inches a year with a mean of 46 inches. There are definite dry and rainy seasons, the rainy season extending from May or June to November or December. Some rainfall is recorded during each month of the year. There is very little natural surface water due to the erratic rainfall, the porous soils, the high rate of evaporation caused by the constant trade winds, and the presence of relatively few natural stream systems Irrigation of sugarcane is practiced to a limited extent

The population of St. Croix in 1940 was 12,902. Of this total 9,381, or 72.4 percent, were Negroes, and 3,521, or 27.6 percent, were from other races, predominantly Anglo-Saxon and Latin American. The principal cities of the island are Christiansted, with a population of 4,495, and Frederiksted, with a population of 2,498. The remainder of the population lives on scattered estates distributed over the island and may be classed as rural. Most of the houses in the rural area are located adjacent to the highway that traverses the long axis of the island between the two towns, and are grouped on the estates which are confined mainly to the center of the coastal plain. Few houses are found on the southern coast near the sea or in the mountains which border the northern coast. The eastern third of the island is very sparsely settled.

The housing, for the most part, is substandard, and sanitary facilities are in keeping with the low economic level of the people. The domestic water supply is obtained principally from rain water caught in cisterns, wooden tubs, lard cans, and oil drums. According to the 1940 census, 94 percent of the houses had water stored in cisterns and miscellaneous containers. An idea of the primitive conditions under which the people exist is gained from the fact that about 75 percent of the people depend on privies and facilities other than flush toilets, while 20 percent have no toilet facilities. Only 2 percent of the houses have screens.

The houses in the towns of Frederiksted and Christiansted are mostly of wooden construction, while in the rural areas stone houses predominate. These stone houses were built from material found in the ruins of the old Danish estates. The following table shows the

number of houses in the towns and rural areas on the island and the type of interior finish. The latter is important since it has a bearing on the duration of effectiveness of the DDT deposits. Most of the stone houses are calcimined, while a large number of the wooden houses have painted walls.

Type of finish	Number of Houses Frederiksted	Christiansted	Rural	Total
Paint	327	611	269	1,207
Calcimine	130	118	461	709
Paper	35	42	5	82
Plaster	--------	1	------	1
Unfinished:				
Wood	142	188	168	498
Wood and stone	12	2	16	30
Stone	6	4	130	140
Concrete	2	4	32	38
Galvanized iron	3	--------	58	61
Other	7	22	------	29
Total	664	992	1,139	2,795

C. quinquefasciatus breeds in artificial containers (such as tin cans, cisterns, and water barrels) and in polluted water found in privies, ditches, etc., closely associated with human habitations. The adults are found resting in and around houses. Usually associated with it in the Tropics is *A. aegypti*, the vector of urban yellow fever and dengue.

The majority of domestic mosquito breeding on the island occurs in water stored around houses. During the principal part of the rainy season, which occurs in September, October, and November, some *Culex* and other mosquito breeding takes place in swampy areas where drainage to the sea is interrupted. Few of the areas, however, are located near the towns.

Methods and Procedures

When the DDT residual spraying program was started in October 1946, the personnel consisted of a local supervisor, who was trained in Puerto Rico by the Public Health Service, and a spray crew consisting of 1 foreman, 1 truck driver, and 5 spraymen. Concurrent with the beginning of spraying operations, houses in the two towns and on the larger rural estates were spotted on maps and numbered, and a census of the population was made. Also, data on the type of house construction, the number and dimensions of the rooms, and the type of inside finish were recorded for use in determining the amounts of spray required. During the first treatment all buildings were sprayed, but in subsequent sprayings only occupied houses and schools were treated.

Initially, hand sprayers fitted with flat atomizing nozzles were used. When an orchard type sprayer of 50-gallon capacity became available, this equipment and the hand sprayers were used for the three subsequent applications.

During the initial spraying various formulations of DDT isomer in kerosene were used. This material later was replaced by a 35-percent DDT-Xylene concentrate, with Triton X–100 added as an emulsifier, diluted with water to form a 5-percent spray. Since some difficulty was encountered with this material due to its chemical reaction with the metal in the drums which resulted in its staining certain types of wall surfaces, a 25-percent DDT-Xylene-Triton concentrate was substituted.

Applications were made to the wall surfaces at the rate of 200 mg. of DDT per square foot. This was achieved by applying the 5-percent spray at a rate of 190 square feet per minute with the hand sprayers and about 230 square feet per minute with the power sprayer. This rate could be approximated easily by spraying the surface to the point of saturation without allowing the material to run. The walls and ceilings of the rooms, the porches, and privies were sprayed. Furniture was not treated, and extra care was taken in the finer homes to protect the furniture. In a few cases chicken houses were treated upon the request of the municipal physician, but routinely only living quarters and schools were included.

During the fiscal year 1947 an effort was made to reduce the cost of spraying to determine how much per house it would cost to achieve maximum results with a minimum of labor and materials. It was found that, after the initial mapping and organizational activities had been completed, a crew composed of one foreman to contact householders, supervise the work, and make reports; a chauffeur to drive the truck and operate the power sprayer; and three spraymen were all that were necessary to make a round of treatment three times a year. Also, means were devised to organize work procedures more efficiently.

While the entire cost of the project was borne initially by the Public Health Service, it was desirable to have the island government share as much of the cost as possible, looking forward to the time when the project could be made self-sustaining. With this in mind, a revolving fund was set up and assessments were made against the householders. This phase of the work was entirely independent of the operational phases, but as the second spraying progressed, it was noted that a sizeable number of refusals were being encountered. To counteract this, the aid of the municipal physician was solicited. During the third spraying, the project foreman made a record of each such refusal, including the name and address and reasons for refusing (predominantly inability to pay). These records were turned

over to the municipal physician. The municipal physician obtained the necessary cooperation with the result that very few refusals were encountered during the fourth spraying.

Accomplishments

Table 1 gives a summary of pertinent data for the four sprayings. These were compiled from the daily reports of the spray foreman and from the pay roll records and represent actual expenditures. Records of the first two sprayings are based on the actual number of square feet per house. However, after it was determined that the average house contained 1,900 square feet, this figure was used in the

Table 1. *Summary of the four DDT residual sprayings of premises on St. Croix, V. I., October 1946 to May 1948*

[Based on actual expenditures]

	First	Second	Third	Fourth	Total
Number of houses sprayed	2,883	2,530	2,731	2,934	11,078
Total square feet treated	5,382,700	4,933,500	5,188,900	5,574,600	21,079,700
Total gallons 5% DDT spray solution used	5,999	4,895	5,078	5,660	21,632
Total working days	109	88	100	103	400
Total man-hours	7,334	5,680	4,602	4,014	21,630
Cost of materials	$1,663.16	$1,224.82	$1,366.31	$1,618.76	$5,873.05
Cost of labor	$3,464.99	$3,891.12	$2,853.46	$2,232.54	$12,442.11
Cost of gas, oil, etc. (transportation)	$179.85	$212.85	$330.00	$339.90	$1,062.60
Total cost	$5,308.00	$5,328.79	$4,549.77	$4,191.20	$19,377.76
Average number square feet per house	1,900	1,900	1,900	1,900	1,900
Average number gallons of spray solution per house	2.12	1.93	1.86	1.93	----------
Average deposit of DDT (mg./sq. foot)	337	197	194	201	----------
Average number houses sprayed per working day	26.0	25.3	27.3	28.5	----------
Average number man-hours per house	2.59	2.25	1.68	1.37	----------
Average number man-hours per 1,000 sq. feet	1.36	1.15	0.89	0.72	----------
Average cost per house	$1.81	$2.11	$1.67	$1.46	----------

First spraying: October 9, 1946, to March 16, 1947.
Second spraying: March 17, 1947, to July 18, 1947.
Third spraying: July 21, 1947, to December 10, 1947.
Fourth spraying: December 11, 1947, to May 10, 1948.

summation of the data. It will be noted that the cost of materials remained about the same for the four sprayings. The relatively high personnel costs during the second spraying were caused by the placing of employees under classified civil service at annual salary rates. Since continuous employment could not be provided, arrangements were made during the third spraying to return the foreman and spraymen to an hourly rate. Also, the program no longer required full-time local supervision, and the technical supervision and direction thereafter were furnished by periodic visits of personnel from the District U. S. Public Health Service Office in San Juan, Puerto Rico. By demonstrating the feasibility of these economical methods of operation, it was hoped that the entire cost of the project soon could be assumed by the local government. The reduction in the spraying crew resulted in a gradual lowering of the average number of man-hours per house and a slight rise in the average number of houses sprayed per working day. The cost per house during the

fourth spraying was only $1.46 as compared to $1.81, $2.11, and $1.67, respectively, for the first three sprayings.

Based on experience in operating the program to date, the following recommendations for continued operations are indicated:

1. Use a spray crew consisting of one foreman and two sprayers.
2. Make two complete sprayings of the island each year.
3. Use new transportation; the time lost in maintaining old trucks is considerable. The remoteness of the island makes mechanical failures difficult to remedy.
4. Most of the houses on the island are poorly constructed and about 80 percent have absorbent interior surfaces. Therefore, 50 percent wettable DDT, since it is applied in particulate form, may be more suitable than solutions or emulsions, and its effectiveness should be determined. Modification of present equipment or the securing of new equipment which would be suitable for applying water suspensions would be necessary.

Summary

The operational phases of an island-wide DDT spraying program to control filariasis transmission by destroying its mosquito vectors on St. Croix, Virgin Islands, are discussed. The medical and entomological phases of the program were carried out by the staff of the School of Public Health, Columbia University, and are reported in the article which follows. The residual spraying was under the direction of the Communicable Disease Center of the Public Health Service, San Juan, Puerto Rico.

ACKNOWLEDGMENTS

The following officers of the Public Health Service initiated and set up the procedures of the spraying program: Porter A. Stephens, sanitary engineer (R); Arthur H. Neill, sanitary engineer; Howard W. Spence, S. A. sanitary engineer; and George A. Thompson, S. A. sanitarian (R). The original survey made by Dr. Harry D. Pratt, scientist, was of great help in conducting the program.

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Filariasis Control by DDT Residual House Spraying, St. Croix, Virgin Islands

II. Results

By H. W. Brown, M. D., and R. W. Williams, Ph. D.*

The control of Bancroftian filariasis, malaria, or yellow fever may be achieved by two methods: (1) by reducing the mosquito vectors to a number that will minimize transmission of the parasites to man; (2) by shortening the life of the adult mosquito and thus preventing complete development of the parasite in the mosquito.

Soper, Wilson, Lima, and Antunes (*1*) have demonstrated the workability of the first method, and have detailed the procedures involved. But such a program is expensive and necessitates continued effort. The success of DDT residual spray programs in malaria control suggests the second as a cheaper, less complicated method of controlling filariasis, although it is not as permanent.

While a program of spraying each habitation with a residual DDT solution has the advantage of simplicity and cheapness, its efficacy is unknown. The purpose of this study was to ascertain its effects over a period of 5 to 10 years on the filaria incidence of St. Croix, Virgin Islands. The island was chosen because of its high filaria rate, convenient size, and cooperativeness. After 2 years of the spray program, an attempt at control of filariasis through treatment of every individual on the island was instituted by another research group; it was therefore considered useless to continue this study.

The details of the DDT spray technique used and frequency of application are given by Kohler in the preceding report, Operational Aspects. Our assessment of the effectiveness of this measure consisted of pre- and post-DDT spray mosquito surveys, and nocturnal blood smears on the school population.

Mosquito Surveys

To ascertain the effectiveness of the residual DDT spray, when applied to the interior of houses, in reducing the transmission of *Wuchereria bancrofti*, a prespray mosquito survey was made, and a survey subsequent to the spray program was compared with it. The purpose of these surveys was to determine what mosquito species were involved in the transmission, what percentage of each species was infected with the parasite, the number of houses which harbored

* School of Public Health, Columbia University, New York, N. Y.

mosquitoes, and the number of each species to be found in the dwellings.

It is the custom of the majority of the inhabitants of the island to retire early, closing all window shutters and doors. Screens are rarely used. *Culex quinquefasciatus* Say (*fatigans* Wiedemann), the chief vector of filariasis on the island, readily enters houses through the shutters and other openings, feeds on man at night when the microfilariae of *W. bancrofti* are most abundant in the peripheral blood, and usually remains in the houses throughout the night. Giglioli (*2*) found that in British Guiana *C. quinquefasciatus* accounted for 66 percent of all mosquitoes found resting in houses after dawn. This mosquito frequents dark portions of the rooms throughout the day on St. Croix, but may leave in the morning when the shutters are opened or when otherwise disturbed by the occupants or blown out by the strong trade wind. Some never enter houses since they are also zoophilous and feed on chickens, dogs, mules, goats, cattle, etc. They may remain in outdoor resting places throughout the day. Since this program was not intended to eradicate mosquitoes but to determine what effect residual DDT has on the transmission of *W. bancrofti*, mosquito collections were made only in houses, where the majority of mosquitoes caught probably had fed on human blood.

The entire island was divided into three major collecting centers: the towns of Christiansted and Frederiksted, and the sugarcane estates. The towns were further divided into a number of sections more or less equal in size. It was possible for two crews of two men each to visit every house in two such sections during the course of a day's work. The two crews began at adjacent houses and worked in opposite directions around a block, searching for mosquitoes in each house they entered. When the occupants of a house were not at home, collecting was not attempted, and on a few occasions permission to enter was not granted. One section of a town could be covered in 2 to 3 hours. The mosquitoes were then brought into the laboratory, dissected, and examined for developing forms of *W. bancrofti*.

Only two species of mosquitoes were found in the houses, *C. quinquefasciatus* and *A. aegypti*. No anopheline problem has existed on St. Croix since 1934 when a vigorous campaign virtually eliminated this genus. *C. quinquefasciatus* was found in greatest numbers in bedrooms. For the most part they were found resting in the darker regions of the room such as in clothes presses, behind furniture standing close to the wall, on dark or black clothes, umbrellas, etc., hanging on wall hooks, under tables, desks, and dressers, and behind open doors. One notable exception to a dark resting place was the white lace fringe hanging from the canopies over the beds, a material comparable to cobwebs and mosquito netting which are recognized as attractive

resting places for this species. *A. aegypti*, although more common in the bedrooms, could be found more frequently in the other rooms of the houses than could *C. quinquefasciatus*. For the most part they were found in the resting places preferred by *C. quinquefasciatus*.

Collecting was done with an aspirator, made from a 250 cc. filter flask with tubulature, and a flashlight. The flask could be kept in a pocket or could be held conveniently in the hand. The mosquito intake hose was 3 feet in length tipped with a 2¾-inch (diameter)

Mosquito collecting aspirator.

aluminum funnel. The suction hose was of a sufficient length to permit ample freedom of movement of the head when the flask was in a pocket. The long hose permitted the collectors to reach at arm's length into narrow spaces between furniture and the walls, bend the intake hose, and place the funnel over a resting mosquito, thus collecting specimens which otherwise would have been unobtainable with conventional types of mosquito-collecting apparatus. The mosquitoes were brought alive into the laboratory, killed with ether fumes, and dissected.

Two men did the dissecting. The first removed the legs and wings, placed the mosquito on a clean slide and passed it to his co-worker

who divided the insect into its three body regions in a saline solution. A plastic coverslip, capable of withstanding considerable pressure, was applied rather firmly onto the arthropod, rupturing it at various places. The slide was then passed to the observer who examined each body region through a binocular dissecting microscope having 15x eyepieces and 3x and 6x objectives. The muscle fibers of the thorax or pieces of body wall, etc., could be rolled and maneuvered by applying pressure to the coverslip with the eraser end of a pencil, thus exposing hidden worms. With proper illumination, all forms of the parasite could be seen. The more or less immobile sausage forms in the thorax could readily be distingusihed from muscle fibers by the difference in refractive index. The fourth member of the crew notified the sections of town which would be covered in the following day's work.

It is conceivable that filaria larvae found in wild *C. quinquefasciatus* or *A. aegypti* might be from animals other than man. However, O'Connor and Beatty (*3*), in an excellent study of *W. bancrofti* on St. Croix, failed to find microfilariae in the blood of cats, rats, mice, goats, bats, chickens, ducks, turkeys, domestic pigeons, wild mongooses, and several species of lizards. Thirty-three percent of the dogs examined by them contained microfilariae of *Dirofilaria immitis*. However, they found that this parasite did not develop readily under experimental conditions in either *C. quinquefasciatus* or *A. aegypti* and concluded that although these mosquitoes may become infected under natural conditions, neither of these insects is the main vector in the transmission of canine infection on St. Croix. The development of this parasite usually takes place in the malpighian tubules rather than in the thoracic muscles as does *W. bancrofti.* Of nearly 4,000 wild mosquitoes which were caught and examined, none contained developing filariae in or near these tubules. O'Connor (*4*) found ground doves infected with *Vagrifilaria columbigallinae*, and a similar parasite was more rarely found in both the white and the redheaded pigeons as well as in the mountain dove. Efforts to infect *C. quinquefasciatus* with this parasite were unsuccessful, and O'Connor and Beatty (*3*) concluded that since these birds do not nest or roost close to human habitations it is improbable that they would infect domestic mosquitoes within the areas studied. It therefore seems reasonably safe to assume that the developing filariae found in either *C. quinquefasciatus* or *A. aegypti* were forms of *W. bancrofti*, with few, if any, exceptions.

The prespray mosquito survey was made during June and July 1946. At this time the mosquito population was so small that many individuals who as a rule slept under bed nets no longer did so, and reported little annoyance from the mosquitoes. Two factors appeared

to be important in explaining this phenomenon. The precipitation from June 1945 to June 1946 was only 32.37 inches, about 13 inches below normal. Cattle were dying in the fields for lack of water. A reservoir in the hills, which normally held 9,000,000 gallons of water, contained an estimated maximum of 150,000 gallons. There was little, if any, standing water and very little water in rain barrels since it was used from these containers about as fast as collected. Secondly, an educational program on DDT was inaugurated about the turn of the year. A series of public lectures and motion pictures was presented by the sanitation department, and in March 1946 commercial DDT was introduced and sold in grocery, drug, and other stores. A store-to-store canvass disclosed that about 450 gallons of 5 percent DDT had been sold between March 1 and June 17, 1946. Of the houses entered in 1946, 47.6 percent had a pint or quart can of 5 percent DDT, and the residents of an additional 19.1 percent used other insecticides (table 1). Although this commercial DDT was applied inefficiently as a space spray with small hand sprayers, it was used so frequently (in many instances every night) that over a period of weeks and months a certain residual deposit would be built up. The spraying was usually done in the bedrooms just before retiring.

Following four sprayings from October 1946 to June 1948, a second survey was made in June 1948. Rainfall for the year, June 1947 to June 1948, was about normal, and the precipitation between March 1948 and June 1948 was 3.31 inches greater than for the same period in 1946. It was found that 1,240 gallons of commercial DDT had been sold in the stores between June 1946 and June 1948, so approximately this amount had been applied inside of dwellings in addition to that applied by the spray crew.

In the prespray survey, *A. aegypti* were abundant, and no attempt was made to collect all those seen in the houses. An attempt was made to capture all of the *C. quinquefasciatus* in each house, since they were the most important vector of *W. bancrofti* and were not nearly as numerous as the *aegypti*. There were a few houses with high populations of *quinquefasciatus*, and from these the catch was limited to 10 or less.

Table 1 summarizes the information on the number of houses entered, the number of houses from which mosquitoes were collected, the number of houses in which commercial DDT was used, etc. In each of the three survey areas the number and percentage of houses with *C. quinquefasciatus* mosquitoes was considerably reduced following the sprayings; however, the average number of mosquitoes collected per house in those houses harboring mosquitoes was not greatly changed. It would appear that *A. aegypti* was successfully eliminated from the houses in our experiment, for no specimens of this species

Table 1. *Summary of mosquito collections before and after the DDT spray program and data on home spraying by the inhabitants*

Houses	Frederiksted		Christiansted		Estates*		
	1946	1948	1946	1948	1946	1946	1948
Total number entered	480	559	861	814	681	169	178
Number not entered	176	208	310	383	564	151	148
Total number visited	656	767	1,171	1,197	1,245	320	326
Number in which mosquitoes were collected	328	151	541	223	422	146	62
Percent of total number visited from which mosquitoes were collected	50.1	19.5	45	18.5	33.9	45.6	19.0
Percent of total number entered from which mosquitoes were collected	78.6	27.0	62.8	27.4	74.8	82.2	34.8
Number *Culex* collected	518	237	768	492	958	396	117
Number *Aedes* collected	307	0	337	0	223	97	0
Average number *Culex* caught per house from which mosquitoes were collected	1.6	1.6	1.4	2.2	2.3	2.7	1.9
Using DDT	212(44.1%)	230(41.1%)	441(51.2%)	336(41.3%)	311(45.6%)	103(60.9%)	71(39.8%)
Using other insecticide	89(18.1%)	36(6.4%)	194(22.5%)	57(7.0%)	104(15.2%)	22(13.0%)	11(6.2%)
Using no insecticide	179(37.3%)	293(52.4%)	226(26.2%)	421(51.7%)	266(39.1%)	44(26.0%)	96(53.9%)

*Due to circumstances beyond our control, it was inadvisable in 1948 to survey all of the estates covered in 1946. The left 1946 column represents the results of the survey of all the estates covered in that year. The right 1946 column includes only those estates from the 1946 survey which were resurveyed in 1948.

were found in the 1948 survey. Eradication of *A. aegypti* was reported by de Caires (*5*) within 13 weeks after a single spraying of 5 percent DDT in kerosene and was maintained for 10 months.

Some 2,244 *C. quinquefasciatus* mosquitoes were caught in the three collecting areas in 1946. Of this number 177, or 7.9 percent, were infected with developing forms of *W. bancrofti* of which 9, or 5.1 percent (0.40 percent of all *quinquefasciatus*), contained infective stages of the parasite. In 1948 only 846 *C. quinquefasciatus* were collected in the houses, of which 31, or 3.65 percent, contained developing worms and none were found with infective forms of the nematode. Thus, about a 50-percent reduction in the percentage of infected mosquitoes [1] and a 57-percent reduction in the number of houses harboring *C. quinquefasciatus* mosquitoes was effected by the application of 5 percent DDT to the interior of the houses in spite of the fact that in 1948 the rainfall was again back to normal and conditions were more favorable for high mosquito populations than in 1946. Table 2 breaks these figures down by collection centers. Of some 867 *A. aegypti* examined in 1946, 20, or 2.3 percent, contained developing forms of *W. bancrofti*. No infective stages of the parasite were found in this species of mosquito. In 1948 not one *A. aegypti* was seen in the houses.

Eighty-six immature forms of *W. bancrofti* were the largest number found in any one mosquito. All of these were presausage forms.

[1] A reduction from 7.9 percent to 3.7 percent is statistically significant.

Table 2. *Filaria infection rates of* Culex quinquefasciatus *and* Aedes aegypti *before and after the DDT spray program*

	Frederiksted		Christiansted		Estates*		
	1946	1948	1946	1948	1946	1946	1948
Culex quinquefasciatus							
Number:							
Examined	518	237	768	492	958	396	117
Infected	48	15	61	12	68	24	4
Infective	4	0	3	0	2	0	0
Percent:							
Infected	9.5	6.3	8.0	2.4	7.0	6.1	3.4
With infective forms	8.3	0.0	4.9	0.0	2.9	0.0	0.0
Of all *Culex* infective	0.8	0.0	0.4	0.0	0.2	0.0	0.0
Aedes aegypti							
Number:							
Examined	307	0	337	0	223	97	0
Infected	7	0	9	0	3	1	0
Infective	0	--------	0	--------	0	0	--------
Percent infected	2.3	--------	2.6	--------	1.8	1.0	--------

*Due to circumstances beyond our control, it was inadvisable in 1948 to survey all of the estates covered in 1946. The left 1946 column represents the results of the survey of all the estates covered in that year. The right 1946 column includes only those estates from the 1946 survey which were resurveyed in 1948.

One mosquito contained 16 preinfective stages in the thorax, another harbored five infective forms in the head and proboscis. The number and percent of mosquitoes containing larvae in various phases of development are given in table 3. In 1946 only 37 percent of the 177 infected *C. quinquefasciatus* contained recently ingested microfilariae; whereas in 1948, 68 percent of the 31 infected *C. quinquefasciatus*

Table 3. *Stages of larval development of* W. bancrofti *in mosquitoes*

	Stomach	I*	II*	III*	IV*	V*	Head†	Proboscis†	Total
C. quinquefasciatus, 1946:									
Frederiksted	11	9	14	4	6	1	2	1	48
Christiansted	13	5	19	6	15	1	1	1	61
Estates	11	17	27	7	4	1	1	0	68
Total	35	31	60	17	25	3	4	2	177
Percent	19.77	17.51	33.63	9.60	14.12	1.69	2.26	1.33	99.93
C. quinquefasciatus, 1948:									
Frederiksted	9	0	3	2	1	0	0	0	15
Christiansted	8	1	2	1	0	0	0	0	12
Estates	3	0	1	0	0	0	0	0	4
Total	20	1	6	3	1	0	0	0	31
Percent	64.5	3.2	19.3	9.7	3.2	0.0	0.0	0.0	99.9
A. aegypti, 1946:									
Frederiksted	4	3	0	0	0	0	0	0	7
Christiansted	2	7	0	0	0	0	0	0	9
Estates	0	3	0	0	1	0	0	0	4
Total	6	13	0	0	1	0	0	0	20
Percent	30.0	65.0	0.0	0.0	5.0	0.0	0.0	0.0	100

*I. Microfilariae in thorax. II. Presausage form in thorax. III. Typical sausage form in thorax. IV. Preinfective forms in thorax. V. Infective forms in thorax. †Infective forms.

contained similar forms.[2] This situation indicates that many of the adults were not living long enough after feeding on human blood for the worms to mature. The fact that no *C. quinquefasciatus* mosquitoes with infective stages of *W. bancrofti* could be found in the houses in 1948 bears out this hypothesis.

In 1946 many of the smaller houses harbored numerous fleas and bedbugs, as well as roaches and centipedes, whereas in 1948 nobody complained of fleas or bedbugs, and a majority of the people felt that the populations of roaches and centipedes had been materially reduced.

Discussion of Spray Program

The use of 5 percent DDT as a residual spray within the houses on St. Croix in the Virgin Islands had a marked effect on the transmission of *Wuchereria bancrofti* by *Culex quinquefasciatus* Say. This mosquito apparently does not live long enough in the presence of DDT for the complete development of the microfilariae to the infective form, although it lives sufficiently long to perpetuate the mosquito species. Also, the zoophilous habits of *C. quinquefasciatus* will keep some of them from entering houses and thus from coming in contact with the DDT. Therefore, the use of DDT alone as a residual spray cannot be considered as an effective measure for eradication of this species. However, the residual spray appears to be very effective in reducing the transmission of filariasis, if indeed not eliminating it, as evidenced by the significant reduction in the percentage of mosquitoes infected and the percentage containing forms in advanced stages of development.

The mosquitoes which do not enter the houses probably are of no great import in the transmission of the disease, although it is conceivable that a few *C. quinquefasciatus* might pick up and pass on an infection without entering a house. Certainly the number falling into this category would be small, for it has been shown that only 0.40 percent of this house-loving species collected from within houses contained infective forms of the parasite. This percentage, small as it is, probably is infinitely larger than the percentage developing infective forms without ever entering a house, since those that do enter feed during the time when microfilariae are most abundant in the peripheral blood, a matter of several hours, as compared to the relatively short time-interval that people might be outdoors during the evening before retiring and at a time when the number of microfilariae in the blood would be relatively low. The possibility that any great number of this domestic mosquito could live as adults 2 or 3 weeks, and feed on human blood at least twice without entering a house, appears rather remote.

[2] This difference is statistically significant.

Blood Surveys

The best proof of the effectiveness of filaria control by the use of DDT would be the finding through periodic microfilaria surveys that young children were no longer acquiring the infection, for an individual once infected will continue to exhibit microfilariae in his blood for years, despite the absence of reinfection. However, it is possible that the death of some adult worms, in the absence of new infection, would be reflected in diminution of microfilaria counts at intervals of 1 to 2 years. Since the prepatent period in filariasis may be as long as a year, new infections appearing within this period should not be ascribed to the failure of control measures.

Our data are based on microfilaria surveys made prior to the DDT program and after 21 months of spraying. Since a study of the younger age groups gives most information, blood smears were made only on children of school age or younger. Children were attracted back to the school by a movie that was shown from 8 to 9:45 p.m., and at its conclusion fingertip blood specimens of 0.04 ml. were obtained. Thick smears of those were made, stained with Giemsa, and the microfilariae on the smears counted. Unfortunately, since the return to school at night often meant walking 3 to 6 miles, the preschool and younger school children came only in small numbers. A night house-to-house survey would have been of great value as young children could have been examined, but it presented insurmountable difficulties. The prespray blood examinations were made early in October 1946, and the postspray examinations in June 1948.

Before the first application of DDT, nocturnal blood smears were obtained from 1,311 children, or approximately one-half of the school population. Although children are probably exposed to infection from birth, a total of 79 children from 3 to 5 years of age were examined without detecting a single infection. The first infections were found in 6-year-olds, and, in this group, 6.2 percent harbored microfilariae. The infection rate gradually increased with age, reaching a maximum of 25.5 percent in the 13-year-olds (table 4). It appears that the acquisition of filaria is a gradual though continual process, and in time it is probably accompanied by a slow loss of some of the worms. Of the 1,311 examined, a total of 164 (13.3 percent) individuals under 15 years of age were found to harbor microfilariae, the counts ranging from 1 to 741 per 0.04 ml. of blood, or in the proportion of 25 to 18,525 per ml. of blood.

After 21 months of DDT spraying of habitations, a resurvey of 906 children gave an infection rate of 10.6 percent. The difference between the 13.3 percent infection rate in 1946 and the 10.6 percent infection rate in 1948 is not quite statistically significant. However,

Table 4. *Filaria infections (W. bancrofti) in children of St. Croix, Virgin Islands, before and after the DDT spray program*

Age	Number examined		Percent positive	
	1946 Pre-DDT	1948 Post-DDT	1946 Pre-DDT	1948 Post-DDT
3	16	2	0	0
4	17	9	0	0
5	46	12	0	0
6	145	67	6.2	2.9
7	145	85	8.9	3.5
8	151	104	11.9	6.7
9	149	118	11.4	9.3
10	177	101	14.4	13.8
11	142	116	14.1	12.9
12	139	101	15.9	17.8
13	106	85	25.5	25.8
14	78	106	16.7	16.0
Total	1,311	906	13.3	10.6

an examination of table 4 shows that the 1948 rates in the 6-to-11-year age group are all noticeably lower than those of 1946.

Microfilaria counts from the same individual may vary considerably from day to day. For example, one individual whose count was made daily over 34 days varied from 172 to 557, about an average of 353 per 0.1 ml. of night blood. Further, the relationship of the number of microfilariae in the circulating blood to the number of adults in the lymphatics is unknown. It is probably safe to assume, however, that in a group of infected individuals, the microfilaria count gives an approximation of the size of the infection, and if in a period of 2 years the microfilaria count is greatly diminished, it is probable that more worms have been lost during this period than have been acquired. The average microfilaria counts by age group for 1946 and 1948 are given in table 5. It will be noted that in the majority of age groups the 1948 microfilaria count was less than that of 1946. The average microfilaria count for the whole group was 74.1 in 1946 and 45.8 in 1948. The difference is not quite statistically significant by conservative criteria.

Another way to compare the data in table 5 is to take into consideration the fact that the children in 1948 were 2 years older than they were in 1946. Using this for comparison, the average microfilaria count of the 6-year-olds in 1946 is compared to that of the 8-year-olds in 1946. On this basis, a drop in microfilaria count in 1948 is noted for each age group in comparison to its count 2 years previously. The average difference noted this way may be adjudged significant.

We should like to emphasize, however, that the counts compared in table 5 refer to those individuals noted as positive either in 1946 or in 1948. A more rigorous comparison may be made by considering only the children present in both surveys.

Table 5. *Microfilaria counts of school children before and after the DDT spray program*

Age years	1946—Prespray			1948—Postspray		
	Number infected	Total count	Average count	Number infected	Total count	Average count
6	9	709	78.7	2	98	49.0
7	12	1,159	96.5	2	38	19.0
8	18	936	52.0	6	432	72.0
9	17	1,486	87.4	10	229	22.9
10	25	2,215	88.6	12	401	33.4
11	21	2,069	98.5	13	901	69.3
12	22	1,242	56.4	18	615	34.1
13	27	1,658	61.4	17	1,356	79.7
14	13	683	52.5	16	333	20.8
Total	164	12,157	74.1	96	4,398	45.8

A total of 504 of the children had their blood examined both in the 1946 and 1948 surveys. Of this number, 454 were negative on both examinations. There were 50 who were positive at one or the other, or both examinations. The total microfilaria counts of 20 individuals went up from 506 to 783 per 0.04 ml. during the spray program. This is an average increase of 14 per 0.04 ml. of blood per individual. Since the date these individuals experienced their rise in microfilaria count is unknown, it is impossible to state whether or not the infection was acquired before the spray program. The total microfilaria count of 30 individuals went down from 3,268 to 1,892 per 0.04 ml. of blood during the spray program. This is an average individual reduction of 46 microfilariae per 0.04 ml. of blood. These data suggest that worm loss was greater than accumulation during the spray program. While the average change for the 50 individuals whose count changed from one survey to the next may be considered statistically significant, we must emphasize that the individual variation was very large.

Discussion of the Blood Surveys

The long prepatent period of *W. bancrofti* makes difficult early assessment of the effect of a DDT spray program by blood microfilaria survey. In addition to the pre-DDT microfilaria base line, an additional blood survey a year later would be of value, for it would detect infections acquired before the spray program but which exhibited microfilariae for the first time during this period.

The microfilaria count of a long-lived infection such as *W. bancrofti* will be affected only slowly by the prevention of additional infection. Assembled mosquito data indicate that the chance of infection after the DDT spray program must have been slight indeed. The blood surveys in general also suggest that new infection was reduced. Both the infection rate in the various age groups and the intensity of the infection as judged by microfilaria counts point to less infection.

The failure of the young children to acquire infection during the spray program is additional proof of the value of this method of control. Taken as a whole, the data suggest that a 21-month spray program was already beginning to affect the filaria infections in children both as to the number of these infections and also their intensity.

If additional studies on the control of filariasis by various techniques are made, it would be highly advantageous to make them in areas where large numbers of children of preschool age could be followed. Studies in areas where the microfilariae are diurnal would also be highly advantageous, as all the school children could be easily examined in school and large numbers of preschool children could also be followed conveniently. Since the mosquito vector would be different, reasonable care would have to be exercised in applying these results to areas of nocturnal microfilaria periodicity. Data from this study suggest that it probably would be of value to make microfilaria counts at perhaps 6-month intervals of all persons found positive.

Summary

The control of *Wuchereria bancrofti* by a DDT spray program of human habitations over a 21-month period was carried out on the island of St. Croix, Virgin Islands, with the following results:

1. The population of *Culex quinquefasciatus*, the vector of filariasis, was reduced approximately 50 percent in the houses.

2. The number of houses in which *C. quinquefasciatus* could be found was reduced by 57 percent.

3. There was a 50 percent reduction of *C. quinquefasciatus* containing forms of *W. bancrofti* which had advanced in development beyond the ex-sheathing of the microfilariae.

4. Before the spray program, 0.40 percent of all *C. quinquefasciatus* examined harbored infective stages of *W. bancrofti*. After the spray program, not a single infective-stage larva was found in any mosquito.

5. *Aedes aegypti* was completely eliminated from the houses.

6. The *W. bancrofti* infection rate in school children dropped from 13.3 percent to 10.6 percent during the spray program, and the average microfilaria count fell from 74.1 per 0.04 ml. of blood to 45.8. The differences are not quite statistically significant by conservative criteria.

7. Of 504 children examined in 1946 and again in 1948, a total of 454 were negative both times. Twenty individuals experienced increases in microfilaria counts, averaging 14 per 0.04 ml. of blood, while the counts of 30 individuals decreased an average of 46 per 0.04 ml. during the spray period.

ACKNOWLEDGMENT

We wish to acknowledge the financial support of the John and Mary R. Markle Foundation and also that of the Communicable Disease Center, Public Health Service, which conducted the spray program. Dr. N. Thetford, chief municipal physician of St. Croix, was instrumental in arranging this study, and Staff Member Dr. S. Bell aided in the blood survey. The technical aid of R. Abramson, V. Brignonni, L. Gerold, B. Gordon, J. Gordon, L. Henry, A. Lang, E. O'Reilly, F. Peterson, and W. Pederson is also acknowledged. Dr. John Fertig, professor of biostatistics, Columbia University School of Public Health, kindly gave us statistical assistance.

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Salmonella Types Encountered in Maryland Between 1944 and 1948

By A. A. Hajna, M.S.*

Since the report in 1945 (*1*) of the Salmonella types isolated in Maryland between 1936 and 1943, data have been compiled for the years 1944 to 1948, inclusive. The results obtained in this second series are summarized here and shown in the accompanying table.

All of the cultures were isolated in the Bureau of Bacteriology of the Maryland State Department of Health, or in Maryland hospitals (particularly in the Johns Hopkins Hospital) to which State service for serologic typing was extended. This afforded (*1*) an opportunity to determine the occurrence and distribution of this group of organisms on a larger scale than was possible in the first report; (*2*) a chance to study the frequency of type occurrence, and (*3*) an opportunity to devise new and more rapid techniques for isolation and identification of Salmonella organisms and related types, using Edwards and Bruner's technique of antigenic analysis (*2*).

The preponderance of cultures, a total of 701, were of human fecal origin, as compared to 47 from human blood. The rest, a total of 49, were isolated either from human disease, or from animals (see table).

There is reason to believe that certain of these organisms may cause septicemia. The desirability for better methods of rapid identification and also for media to be used in the isolation of types, particularly from blood, is indicated. Studies are being made with this in view.

It is now generally believed that the old technique of routine agglutination with known *Salmonella typhosa* O, *Salmonella paratyphi* A, and *Salmonella paratyphi* B antisera is inadequate. This is due to the complex antigenic structures of the Salmonella group organisms.

Bornstein (*4*) suggested the use of three O and four H antigens for routine agglutination tests with sera of patients suspected of having Salmonella infections.

In this study, trial of five O antigens—Groups B to E and *S. minnesota*—with known cases and carriers indicated that not all sera obtained from the studied cases or carriers exhibited the same agglutinins for the organisms isolated. One frank typhoid carrier exhibited no agglutinins for the *Salmonella typhosa* recovered.

For preliminary typing of Salmonellas, Kauffmann and Edwards (*3*) recently suggested the use of five O sera, covering groups A to E,

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on the basis of their own observations of frequency of types found. Our compilation has shown these to be inadequate for identification of types prevalent in Maryland, particularly for *Salmonella minnesota*.

Of the total number, 797, *Salmonella typhosa* leads with 420 isolations. All of these cultures exhibited the antigen, Vi, whether from cases or carriers. Most of the organisms were, however, from carriers. The reason for the inclusion of *Salmonella typhosa* in the compilation was to show the relative frequency of occurrence of this organism as compared to the rest of the Salmonella types.

The cultures studied were divisible into 24 serologic types based on the 1948 revision of the Kauffman and White scheme.

Data obtained in this study are, however, not figures for frequency of incidence of infections based on cases since, in some instances, duplicate or even triplicate specimens came from a single case.

Source and identification of Salmonella cultures

Salmonella type	Group	Source of cultures		
		Feces	Blood	Other
S. paratyphi A	A	3		
S. paratyphi B	B	9		
S. typhimurium	B	94	5	Peritoneum 1; rat 2; cervical abscess 1; guinea pigs 4; mouse 31.
S. saint-paul	B	3		
S. derby	B	46	1	Abdomen 1.
S. bredeny	B	2	2	
S. choleraesuis	C-1	4	14	Pleural fluid 1.
S. oranienburg	C-1	13	1	
S. bareilly	C-1	9		
S. montevideo	C-1	14	1	Hand abscess 2.
S. tennessee	C-1	2		
S. newport	C-2	35		
S. muenchen	C-2	13		
S. manhattan	C-2	4		
S. typhosa	D	401	19	
S. enteritidis	D	6		Rat 1; guinea pig 1.
S. panama	D	8	1	
S. give	E	1		
S. anatum	E	11		Rat 1.
S. meleagridis	E	2		
S. newington	E	3		
S. poona	G	1		
S. worthington	G	2		
S. minnesota	Further	15	3	Subdural 1; cervical abscess 1.
Total		701	47	49.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 18, 1949

For the current week, 278 cases of poliomyelitis were reported, as compared with 243 last week, 252 for the corresponding week last year, and 96 for the 5-year (1944–48) median. Only 13 States reported currently more than 3 cases, and only 5, reporting as follows (last week's figures in parentheses), showed increases of more than 3 cases: Texas 106 (94), California 23 (12), Oklahoma 29 (22), Idaho 7 (2), Pennsylvania 4 (0). Since March 19 (average week of seasonal low incidence of past years), 1,385 cases have been reported (as compared with 1,349 for the same period last year and a 5-year median of 602). The 3 States reporting during the 13-week period more than 45 cases each (aggregating approximately half the total for the period) are Texas (464), California (139), and Oklahoma (92).

Although a net decline occurred in the reported incidence of measles (from 16,813 cases last week to 14,095 currently), both current and cumulative figures continued above the corresponding 5-year medians. The total for the year to date is 550,187, as compared with a 5-year median of 489,214 and 586,748, the highest corresponding figure of the past 5 years, reported in 1946.

Of 25 cases of Rocky Mountain spotted fever, reported in 10 States, 12 cases occurred in the South Atlantic area (7 in Virginia, 3 in North Carolina), 8 in the Mountain area (7 in Colorado), 2 in Oklahoma, and 1 each in South Dakota, Mississippi, and Oregon. The total for the year to date is 180, as compared with 124 for the 5-year median and 147, the largest figure reported for a corresponding period of the past 5 years, reported last year.

During the week, Michigan and North Carolina each reported one case of psittacosis, and New York and New Jersey each one case of anthrax.

Deaths recorded during the week in 94 large cities in the United States totaled 8,851, as compared with 9,025 last week, 8,632 and 8,527, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,632. The total for the year to date is 228,920, as compared with 232,605 for the corresponding period last year. Infant deaths totaled 652, last week 590, 3-year median 646. The cumulative figure is 15,584, same period last year 16,379.

Telegraphic case reports from State health officers for week ended June 18, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine				96		7	1		11			1	5	
New Hampshire				13		1			1					
Vermont				42										
Massachusetts	12			303			8		81				84	
Rhode Island				23		1			2				1	
Connecticut				628	2	36			16				21	1
MIDDLE ATLANTIC														
New York	10	4	(c)	1,596	4	155	3		[d] 117			1	201	3
New Jersey	2		1	1,417		35			32				93	1
Pennsylvania	9		(c)	1,267	7		4		83			7	97	
EAST NORTH CENTRAL														
Ohio	2		1	1,185	3	27	1		81			2	48	13
Indiana	4		1	93	1	2	3		13		1	2	29	21
Illinois		2	6	408	2	63	6		47		2	4	78	2
Michigan [e]	3	1		697	2	45	2		128			1	24	
Wisconsin			2	1,722	1	3	1		35				40	
WEST NORTH CENTRAL														
Minnesota		1		31	2	14	3		11				2	
Iowa				56		1	5		16				2	6
Missouri				52		13	3		4		4	1	2	
North Dakota				22			4		1					
South Dakota				16	1		3	1	1	(2)		1		
Nebraska	1		2	55			5		8					
Kansas				142		4	3		4			2	7	
SOUTH ATLANTIC														
Delaware				11			1		4					
Maryland [e]	2		2	57	(1)	17	(1)	[1] 1	18			1	19	
Dist. of Col.				27		13		1	6					
Virginia			65	374		33		7	15		1	2	43	
West Virginia	2			53		2	3		8				51	
North Carolina	6			470	1		2	3	5				18	
South Carolina		1	123	388	1	69			1			2	39	7
Georgia	1			98		14	3	(2)	3		1	3		13
Florida	4			80	2	5	2		2		1		2	1
EAST SOUTH CENTRAL														
Kentucky	2			73	4	14	3		4			4	14	17
Tennessee	2		13	147	8	47	3		6		1	4	43	
Alabama			1	63		10	3		11		1	2	15	
Mississippi [e]	3		1	41	2	12	8	1	5			4	6	

See footnotes at end of table.

Telegraphic case reports from State health officers for week ended June 18, 1949—Continued

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
WEST SOUTH CENTRAL														
Arkansas	2		2	119	1	12	14		1		11	4	39	5
Louisiana	6		3	11		83	5					2		
Oklahoma			6	154	1	16	29	2	1				7	3
Texas	8	2	289	431	6	167	[1] 106		8		3	5	93	24
MOUNTAIN														
Montana		1		140					4			1	3	
Idaho			6	66	1	5	7		[d] 5			1	3	
Wyoming		1		7		15	1	1	1		1	1		
Colorado	1		7	69		14	2	7	4		1	1	8	
New Mexico	1			30		17	2		1			1	1	
Arizona			22	52	1	4			1				4	
Utah [a]	1			97			2						31	
Nevada														
PACIFIC														
Washington	2		1	173		2	1		13				15	
Oregon	2		3	101	2	7	3	1	5				26	
California	6		5	877	5	18	23		56			6	80	5
Total	94	13	562	14,073	55	1,003	278	25	880	0	28	66	1,294	
Median, 1944–48	162	9	590	11,217	97		96	22	1,922	6	23	82	2,106	
Year to dates 24 weeks	3,534	246	73,102	550,187	[1] 1,897	48,155	[1] 2,309	[1,2] 180	55,471	[2] 39	591	1,148	24,986	
Median, 1944–48	5,871	208	187,067	489,214	3,798		1,049	124	79,409	235	423	1,350	47,752	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32nd) Aug. 14	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	8,648		109,372	602,580	[1] 2,741		[1] 1,385		78,169	[2] 49		688	35,019	
Median, 1943–48 [b]	13,437		331,196	524,160	5,302		602		117,980	318		875	79,018	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for poliomyelitis and typhoid fever the corresponding periods are 1944–45 to 1948–49, inclusive.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately, as follows: Maine 1, Virginia 1, Georgia 3, Tennessee 1, Louisiana 1, California 5. Cases reported as salmonella infection, not included, were as follows: Massachusetts 2.
[1] Delayed reports (included in cumulative totals only): Maryland, May onsets, meningococcal meningitis 1, poliomyelitis 1, Rocky Mountain spotted fever 1; Texas, poliomyelitis, week ended May 28, 10 cases, week ended June 4, 17 cases.
[2] Corrections: Smallpox, South Dakota, week ended Feb. 12, 0 (instead of 1 case); Rocky Mountain spotted fever, Georgia, week ended May 28, 1 (instead of 2 cases).

Anthrax: New York 1; New Jersey 1.
Psittacosis: Michigan 1; North Carolina 1.

Alaska: Measles 3; pneumonia 2.
Hawaii Territory: Measles 88; poliomyelitis 1.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—April 1949.—During the month of April 1949, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chagas disease							[2] 1		1	
Chickenpox	31		8		9		12		60	
Diphtheria	1								1	
Dysentery, amebic	3						3		3	
German measles	1								1	
Hepatitis, infectious							1		1	
Malaria [3]		1	1				43		44	1
Measles			1		4		1		6	
Meningitis		2								2
Pneumonia		9		1	8	2		4	[4] 8	16
Poliomyelitis					1				1	
Tuberculosis		17		10	1	1		10	[4] 1	38
Typhus fever (endemic)	2		1						3	
Yaws							1		1	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] The Chief Health Officer of the Canal Zone states that although in the past few years 3 or 4 cases of Chagas disease have been diagnosed on the autopsy table following death, this is the first human case in which clinical diagnosis during life has been made in this area.
[3] 4 recurrent cases.
[4] Reported in the Canal Zone only.

DEATHS DURING WEEK ENDED JUNE 11, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended June 11, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,025	8,952
Median for 3 prior years	8,917	
Total deaths, first 23 weeks of year	220,069	223,973
Deaths under 1 year of age	590	612
Median for 3 prior years	681	
Deaths under 1 year of age, first 23 weeks of year	14,932	15,710
Data from industrial insurance companies:		
Policies in force	70,406,105	71,058,014
Number of death claims	12,470	13,048
Death claims per 1,000 policies in force, annual rate	9.2	9.6
Death claims per 1,000 policies, first 23 weeks of year, annual rate	9.6	10.1

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended May 28, 1949.—During the week ended May 28, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		38		172	312	25	86	41	171	845
Diphtheria				2						2
Dysentery, bacillary					1					1
Encephalitis, infectious					1					1
German measles		12		144	35	4	60	36	11	302
Influenza		68			6	9	1			84
Measles		104	10	250	226	253	252	449	395	1,939
Meningitis, meningococcal					3					3
Mumps		26		57	207	26	2	19	176	513
Poliomyelitis					1					1
Scarlet fever		4		75	50	2	3	17	8	159
Tuberculosis (all forms)		7	11	50	31	21	7		52	179
Typhoid and paratyphoid fever				1		1			3	5
Undulant fever					1					1
Venereal diseases:										
Gonorrhea		8	14	114	57	13	8	27	63	304
Syphilis		6	8	86	28	3	3	8	20	162
Whooping cough			1	47	28	5	2		1	84

NORWAY

Notifiable diseases—February 1949.—During the month of February 1949, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Anthrax	1	Malaria	1
Cerebrospinal meningitis	5	Measles	4,491
Diphtheria	23	Mumps	817
Dysentery, unspecified	2	Pneumonia (all forms)	3,098
Erysipelas	346	Poliomyelitis	2
Gastroenteritis	1,833	Rheumatic fever	113
Gonorrhea	292	Scabies	2,043
Hepatitis, epidemic	131	Scarlet fever	327
Impetigo contagiosa	2,156	Syphilis	91
Influenza	7,937	Tuberculosis (all forms)	292
Laryngitis	13,352	Typhoid fever	1
Lymphogranuloma inguinale	1	Whooping cough	2,640

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma—Rangoon.—During the week ended June 4, 1949, one case of cholera was reported in Rangoon, Burma.

Ceylon—Trincomalee.—During the week ended May 28, 1949, one fatal suspected case of cholera was reported near Trincomalee, Ceylon, and one fatal suspected case was also reported week ended June 4, in the same area.

India—Calcutta.—For the week ended May 28, 1949, 102 cases of cholera, with 17 deaths, were reported in Calcutta, India.

Plague

India—Calcutta.—For the week ended May 28, 1949, 44 cases of plague, with 5 deaths, were reported in Calcutta, India.

Portugal—Azores.—During the week ended May 28, 1949, one case of plague was reported at Ribeirinha, Ribeira Grande, in the Azores.

Smallpox

Belgium.—During the week ended June 4, 1949, one suspected case of smallpox was reported at Eupen in Leige Province, Belgium.

Colombia.—During the period April 1–30, 1949, 265 cases of smallpox were reported in Colombia.

Great Britain—England and Wales.—In the recent outbreak of smallpox in England, 20 confirmed cases (including 14 imported cases) were reported during the period April 2–May 21. The onset of the last case was stated to have been on May 16.

Italy—Rome.—During the period May 28–June 10, 1949, 5 cases of smallpox (varioloid) were reported in Rome, in addition to the 90 cases previously reported for the period January 1–May 27, 1949.

Java—Batavia.—During the week ended June 4, 1949, 244 cases of smallpox, with 29 deaths, were reported in Batavia, Java.

Nigeria.—Smallpox has been reported in Nigeria as follows: Week ended April 9, 1949, 504 cases, 41 deaths; week ended April 16, 253 cases, 43 deaths; week ended April 23, 392 cases, 55 deaths; week ended April 30, 345 cases, 48 deaths.

Typhus Fever

Colombia.—During the month of April 1949, 202 cases of typhus fever were reported in Colombia.

Yellow Fever

No reports of yellow fever were received during the current week.

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 JULY 15, 1949 NUMBER 28

IN THIS ISSUE

Water Resources and the Nation's Health
Isolation of *Histoplasma capsulatum* From Soil
Cellulose Tape for Diagnosis of Enterobiasis

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE

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Division of Public Health Methods

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CONTENTS

	Page
Water resources and the Nation's health. M. Allen Pond	885
Isolation of *Histoplasma capsulatum* from soil. C. W. Emmons	892
A method of supplying cellulose tape to physicians for diagnosis of enterobiasis. M. M. Brooke, A. W. Donaldson, and R. B. Mitchell	897
Deaths during week ended June 18, 1949	901
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended June 25, 1949	902
Communicable disease charts	903
Plague infection in Colorado, Montana, and New Mexico	906
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended June 4, 1949	906
Cuba—	
Habana—Notifiable diseases—4 weeks ended May 28, 1949	907
Provinces—Notifiable diseases—4 weeks ended May 28, 1949	907
Finland—Notifiable diseases—April 1949	907
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Cholera	908
Plague	908
Smallpox	908
Typhus fever	908
Yellow fever	908

Public Health Reports

Vol. 64 • JULY 15, 1949 • *No. 28*

Water Resources and the Nation's Health

By M. ALLEN POND, B. S., M. P. H.*

Water is one of the most important single natural resources upon which man depends for his existence. Arranging for its proper use presents problems of tremendous complexity. Besides the fundamental role water plays in life processes, water may be a vehicle of infection; agriculture and the industrial machine are dependent on abundant supplies; entire industries harvest and distribute edible marine products; inland navigation is a major factor in regional and national economy; recreational uses of natural water courses are not only big business but important to the mental and physical health of millions of Americans. In addition, water is a primary source of power, and lack of planning for the proper use of watershed areas has resulted in the loss of valuable soils through erosion, in the destruction of crops, and in tremendous economic losses from floods. Urbanization is dependent on availability of abundant supplies of potable water. Finally, natural water courses are the only feasible sites for the disposal of the liquid wastes from communities and industries.

The sanitary engineer cites this list of water uses and problems because of its health implications. For instance, the harnessing of hydraulic energy in the Tennessee, Columbia, and many other river valleys has obviously bettered the standard of living of hundreds of thousands of families, and their health has been measurably improved. Again, the irrigation of previously arid lands has not only raised the standard of living of thousands of farm families, but has also wrought a significant improvement in the diet of millions of city dwellers. Further, the control of flood waters in many river basins has decreased soil erosion, thereby preserving important grasslands threatened with destruction, and also has prevented the periodic flooding of homes. In addition, the recreational use of clean lakes and streams as well as salvaged bottom lands offers release from the tempo of modern community life.

*Senior sanitary engineer, Public Health Service. This article is condensed from a talk delivered at National Citizens Conference on Community Planning in Oklahoma City, Oklahoma, March 30, 1949.

It cannot be overemphasized that the health significance of water use programs goes far beyond physical, bacteriological or chemical standards for drinking water quality. In a sense health considerations are ubiquitous in every water use program. Those concerned with planning and developing controls for water resources must constantly be aware of all health implications of their work. This, however, does not preclude serious consideration of water use activities which produce direct or indirect health hazards. The classic example, of course, is the use of natural water courses as the receiving bodies for untreated sewage and industrial wastes.

Man in his proclivity for urbanization throughout the history of modern civilization has continued to despoil the waters with the result that serious obstacles have been put in the path of community growth and development. Although we all are aware of the bounty which is put on water by peoples of arid regions, it is not readily recognized that continued pollution of once clean and quantitatively abundant sources may result in acute shortages of potable water in areas where lack of water has been no problem.

Urban Water Requirements

The waterworks industry in the United States is large. There are now more than 14,000 public water supply systems in the country which provide about 8 billion gallons of water daily to about 85 million people (*1, 2*). It is not uncommon for large cities to use the equivalent flow of a sizable river. The excellent quality of this water is a tribute to our waterworks operators.

The remaining third of our population obtains its water from individual wells and untreated sources, and it has recently been estimated that 6 to 7 million rural families need either new or improved water supplies (*1*).

In the more densely populated areas of the East and Middle West, two major developments are complicating the problem of maintaining good public water supplies These are (1) a progressive depletion of ground water supplies as a result of overdrafts in underground reserves, and (2) a marked increase in pollution of surface sources of water by sewage and industrial wastes. Meanwhile, our needs for clean water are increasing because of industrial growth and more lavish domestic use of water.

Lowering of the water table in some coastal areas has resulted in salt water infiltration of the ground water, thereby impairing it for domestic and some industrial uses. In other parts of the country ground water depletion has proceeded at such an alarming rate as to create a threat in some communities of complete exhaustion of supplies. Recharging of subsurface water courses has become common practice in many areas.

In many instances, raw water pollution has necessitated extension and elaboration of existing water-purification facilities. In some areas, treatment alone is insufficient to cope with the problem. Boston, New York, San Francisco, Los Angeles, and Tulsa, among a number of large cities, have had to reach out at great expense to distant and essentially uninhabited watersheds.

While the need for water continues with the increase in population and industry, its absolute quantity remains the same, and in fact, in terms of usable water, is actually getting less. Unless the trend to more extensive pollution is reversed, drinking water, which is now "almost as free as the air," will command a premium in the not too distant future.

Availability of water is one of the principal considerations in the location of industries which use it directly as a commodity as well as in processing. Quality as well as quantity is important. The steadily growing canning industry, for example, could not exist without water. Three gallons of processing water are wasted in packing a No. 2 can of asparagus; a gallon for a can of corn or peas; 7 gallons per can of spinach; and as much as 10 gallons for a can of lima beans. The production of pulp and paper involves the use and wastage of tremendous quantities of water. To produce one ton of soda pulp, 85,000 gallons of water are needed; for one ton of paper, from 40,000 to 50,000 gallons.

In cotton textile production, water is needed in every step. For 1,000 pounds of goods, 60 gallons of water are needed for sizing, 1,100 for desizing, from 1,700 to 3,400 for kiering and scouring, 1,200 for bleaching and 30,000 for mercerizing. The dye processes, depending on the particular process used, require another 5,000 to 20,000 gallons of water per 1,000 pounds of cloth. In total, 45,000 to 50,000 gallons of water are used in producing a half ton of dyed cotton cloth. An average of 770 gallons of water is used for every 42-gallon barrel of crude oil refined in the United States.

In comparison, the average domestic use is approximately 50 gallons per capita per day.

It sometimes is forgotten that the used water always produces liquid wastes. Untreated industrial wastes play havoc with streams when discharged in large quantities and often overburden existing sewage treatment plants. An example of one of the results of improper wastes disposal illustrates its indirect health significance. The causes of tastes and odors in water are complex, but often are related to chemical wastes. Otherwise safe but poor tasting or malodorous, public water supplies may be so unpalatable that citizens will turn to esthetically satisfactory but potentially unsafe springs and wells for their drinking water.

Water-Borne Disease

One of the singular achievements in public health history has been the development and successful use of methods for the purification of contaminated waters. Fifty years ago water-borne typhoid fever, dysentery, and diarrhea and enteritis annually claimed a tremendous toll of human life and caused a much greater amount of disabling illness and suffering. Records indicate that stream pollution was already serious. Yet in the intervening years, and despite a significant increase in the total amount of pollution from domestic sewage and industrial wastes, the health hazard of contaminated waters has been reduced decisively by the introduction of chlorination, the extension of filtration, and the general improvement in water plant operation. The waterworks profession has performed excellently in establishing barriers against water-borne disease, particularly in those communities which must obtain water from seriously polluted streams. Nevertheless, contaminated waters continue to be a source of explosive outbreaks of gastroenteritis.

Furthermore, additional research is needed to determine the role that water plays as a vehicle for the spread of other diseases. The need is especially acute in regard to virus infections. There is also a lack of precise knowledge concerning the health significance of many chemical elements found in water. Sanitary engineers and others familiar with the problems are convinced that reliance solely upon water treatment for the prevention of water-borne disease is not only unwise but potentially hazardous.

Management of Water Resources

Water-borne enteric disease is not the only health hazard associated with water use. An example of the intertwining of water conservation efforts and the creation of potential health hazards is to be found in the development of malaria mosquito breeding sites in impounding reservoirs. The success of the Tennessee Valley Authority in controlling—indeed, in practically eradicating—malaria in its sphere of operations is a classic example of the value of careful planning. If history had been permitted to repeat itself, the incidence of malaria along the banks of the Tennessee River and its tributaries would have skyrocketed during the late thirties and the present decade. Instead, the carrying out of well-conceived plans to control mosquito breeding in the basin has resulted in a dramatic decrease in the malaria morbidity rate among residents of the valley.

As the population of the United States has increased, and the Nation has assumed a larger role in world affairs, it has turned to an increasing extent to the irrigation of previously arid regions. Such reclamation activities have positive health significance, but health

problems also may be created by irrigation projects. An illustration of the health hazards that may result from such projects is to be found in the increase in reported malaria during the 1930's among residents of farms proximate to new irrigation ditches in central California. Malaria literally accompanied the waters which transposed once arid lands into fertile fields. Subsequently, steps were taken to control the mosquito vectors. It is now common to develop mosquito abatement measures in connection with irrigation projects.

In some irrigated areas enteric disease has been a local problem. Farm workers, not realizing the hazards involved, have drunk from polluted irrigation ditches with dire results. There has been a hint also that improper control of irrigation waters used on truck farms has resulted in the serious and potentially hazardous contamination of leafy and other vegetables eaten raw. The large volume of interstate traffic in such foodstuffs takes this problem out of the realm of a purely local issue.

These illustrations point up a principle: improvements in water uses, unless carefully planned, may be accompanied by newly created health hazards.

Stream sanitation programs throughout the United States are planned to make the most effective possible use of available flows. In the comprehensive program now being developed jointly by the Public Health Service and State water pollution control authorities, streams will be studied to determine their most reasonable primary use. In this connection, close cooperation exists between the Service, the Corps of Engineers of the Army, the Bureau of Reclamation of the Department of the Interior, and the States. In many watersheds where major flood control projects are under way, the Public Health Service has been asked to make recommendations as to minimum flows necessary to prevent the creation of nuisances and health hazards. Planning for prevention is in accord with the highest ideals of health workers, and such joint planning will be effective in promoting the health of millions of Americans in years to come.

Accomplishments and Ambitions

It is unrealistic to describe the unsolved and complex water resources problems of the United States without noting at the same time some of the achievements in meeting them. From the public health standpoint, a new chapter in the history of accomplishment was written by the men and women who planned and developed the great Tennessee River valley. The harnessing of the energies of that stream has been accompanied by a rise in the standard of living for residents of the valley, an improvement in their general health indices, and the control of serious potential health hazards. Future coordinated efforts to develop a river basin will be well guided by

the record of the Tennessee Valley Authority. Even now there are several Federal and State agencies planning the development of the Missouri River basin. In that great enterprise there is active collaboration of the technicians and administrators and citizens involved.

The pattern of growth of the United States during the past century has wrought fundamental changes in the water resources picture. When water demands were small, so too were the problems of liquid wastes disposal. Natural processes in the streams and coastal waters were adequate to stabilize the sewage and industrial wastes deposited in them. But the situation has changed; modern industrial and domestic water requirements are proportionately many times greater than the growth of population would indicate. The development of new industries which utilize vast quantities of water and discharge tremendous amounts of organic and inorganic wastes; and the greatly increased density of population in a relatively small number of places—the same localities, by and large, in which industry is concentrated—have resulted in the compounding of stream sanitation problems. No longer can streams be depended upon to recover by themselves from the uncontrolled dumping of liquid wastes. Man, who created these problems, now must work for their solution.

An important step in this direction was taken with the enactment of the Water Pollution Control Act of 1948 (P. L. 845, 80th Cong.) which authorizes the Public Health Service and the Federal Works Agency, together with the States, to develop a nation-wide program for the abatement of stream pollution. The language of the law is clearcut: ". . . it is hereby declared to be the policy of Congress to recognize, preserve, and protect the primary responsibilities and rights of the States in controlling water pollution, to support and aid technical research to devise and perfect methods of treatment of industrial wastes which are not susceptible to known effective methods of treatment, and to provide Federal technical services to State and interstate agencies and to industries, and financial aid to State and interstate agencies and municipalities in the formulation and execution of their stream pollution abatement programs." From a planning standpoint, and from the point of view of the health official, this legislation represents an important milestone in the national effort to conserve our water resources.

Pending the appropriation of funds to support this work, the regular staffs of the Public Health Service and the Federal Works Agency have been drafting rules and regulations for the program. Comprehensive plans for river basin work are being developed jointly by the Public Health Service and the several State water pollution authorities. The stage is being set for the start of this significant program.

During the past half-century, progress has been made in solving many of the technical problems in water pollution control. Research in this field is going ahead at an increasing tempo. The research of the Public Health Service itself is indicative of the range of scientific interests in the health aspects of our water resources. At the Environmental Health Center in Cincinnati, work is being done on the biology and chemistry of sewage and industrial waste treatment, and, recently, important progress has been made there relative to the treatment of wastes containing radioactive materials. At Woods Hole on Cape Cod, the Service is engaged in a long-term study of the effects of pollutants on waters in which shellfish are grown. Epidemiological studies have been in progress in the lower Lake Michigan area to determine what relationships exist between the health of bathers and the quality of the water in which they swim. These are but a few of the Public Health Service investigations. In scores of other laboratories, at universities and industrial establishments, there are significant research projects in the same field. Technical knowledge relative to water pollution is rapidly expanding.

Conclusion

In the years ahead, this country will be confronted with increasingly difficult problems in the conservation and use of water. It is imperative that all interests be brought into the planning process; that standards be set for legitimate uses of all major water courses; and that a realistic and effective program to conserve water be developed.

Planning for the conservation and proper use of water resources is not and cannot be the sole responsibility of a single professional or administrative group. The competencies and the interests involved are varied. Water conservation projects are not designed for irrigation alone, for wildlife protection, nor for flood control, nor only for the abatement of stream pollution. Rather, they are multipurpose jobs. Every water conservation program has health implications, and public health workers are always ready to participate in the planning and carrying out of such activities.

It has been the experience that professional planning and action without citizen participation tends to be not only naive but sterile. Water is such a precious natural resource that all must work together—citizens and professionals alike—to conserve it and plan for its best use.

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Isolation of *Histoplasma capsulatum* From Soil

By C. W. Emmons*

Several of the fungi pathogenic for man appear to have an independent saprophytic existence in the soil or in decaying vegetable matter. *Sporotrichum schenckii* was isolated from plants in 1908 by Gougerot and deBeurmann (*12*), and several later investigators have isolated it from soil or plant material (*1*). The author has isolated it from sphagnum moss (*10*) and from soil (*6*). *Aspergillus fumigatus* and *A. niger* grow on decaying vegetation at the surface of the soil. Medical histories of wounds and exposure preceding infection indicate that several of the fungi which cause various types of mycetoma are probably present in soil as saprophytes. The acid-fast actinomycete, *Nocardia asteroides*, has been isolated from soil (*11*, *6*). *Coccidioides immitis* is present in soil in the endemic area of coccidioidomycosis (*15*, *2*, *4*), and human infections can be best explained by inhalation of air-borne spores from the soil. The ecologic relationship of these pathogenic fungi to the soil is not known, but the existence of naturally acquired coccidioidomycosis in certain species of rodents peculiar to the desert has suggested in the case of Coccidioides that this fungus may be in soil contaminated by infected animal hosts (*5*). All these mycoses except coccidioidomycosis are widely distributed geographically.

Another mycosis which appears to be noncontagious, sporadic, and world-wide in distribution is histoplasmosis. Whether one speaks of proved histoplasmosis which, so far as is definitely known, is relatively rare and almost always fatal, or of a hypothetic mild form of the disease associated with pulmonary calcification, the source of the infectious agent and the mode of human infection have been unknown. Histoplasmosis has been recently shown to occur in wild rats in Virginia (*Rattus norvegicus*) (*8*) and in Georgia (*R. norvegicus* and *R. rattus*) (*9*), and in the skunk (*Spilogale putorius*) (*9*). A total of 24 rats with histoplasmosis have now been collected in Virginia (*6*). No association between infected animals and histoplasmosis in man has been found in this area to date, and the relationship of rodent to human infection remains obscure. Indeed, the very limited extent of the lesions and the apparent chronicity of the disease in naturally infected rats in which histopathologic studies were made do not suggest any mode of transfer directly from rats to man (*7*). The characteristics of histoplasmosis in naturally infected rats seem to be similar to chronic histoplasmosis in experimentally infected guinea pigs which

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may harbor the fungus without evidence of illness for as long as 2½ years (*8*). A similar chronic disease occurs in experimentally infected rabbits, rats, and mice (*6*).

The possibility of an environmental source of infection common to man and animals has stimulated continued search for Histoplasma in the environment of rats with naturally acquired histoplasmosis. From December 18, 1946 to December 18, 1948, 387 samples of soil and various types of debris were collected from farm premises in Loudoun County, Va. *Histoplasma capsulatum* has been isolated from two of these soil samples.

Samples were collected in and around barns and other buildings from which infected animals have been taken. A few included a wide variety of materials such as moldy corn, chaff from hay mows, well-rotted manure from stables, soil with high humus content, and red clay. A large number of soil samples were selected from rat runs and the entrances to rat burrows, and many of these samples contained considerable amounts of rat droppings.

The sample was taken directly into a large sterile glass tube by scooping up the specimen with the lip of the tube. Appropriately labeled, it was kept in this tube. In the laboratory a portion of a specimen was placed in a 100-cc. sterile cylinder. Approximately 10 times the volume of sterile physiological sodium chloride solution was added, and the mixture was stirred vigorously. The soil suspension was allowed to stand from 30 minutes to 2 hours, and a 10-ml. sample was then withdrawn from the top of the column in an attempt to collect any spores which had floated to the surface of the suspension. One ml. of the sample was injected intraperitoneally into each of four mice and the remainder of the suspension was discarded. The mice were killed after 3 to 5 weeks and cultures were made from livers and spleens. After September 1947, all mice used in these tests were kept in a room in which no animals with experimental histoplasmosis had ever been housed.

Histoplasmosis developed in mice inoculated with suspensions made from two soil samples (Nos. 334 and 335) collected October 4, 1948. Two repetitions of the above experiment resulted in the isolation of Histoplasma twice more from sample No. 334 and once more from No. 335. These samples were from adjacent sites within a radius of 1 foot under the edge of an out-building on a farm where histoplasmosis had been proved in 7 of 43 rats trapped.

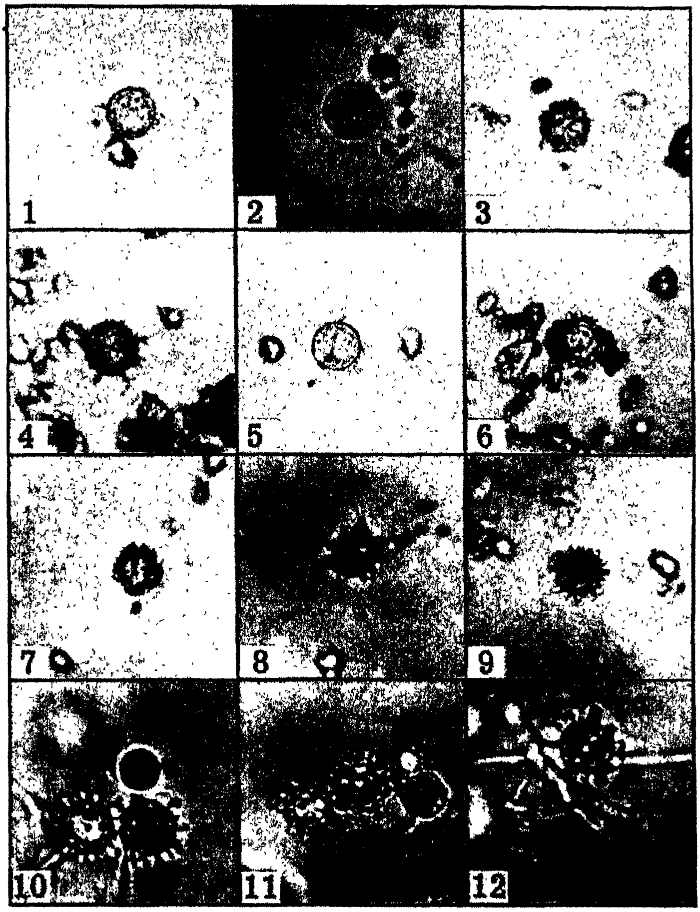
These samples were similar in character. They were red clay loam containing very little humus. They were collected from mounds of earth presumably removed from rat burrows. No rat droppings were observed in the specimens, but there were a few hairs, probably rat hairs, and a few fragments of feathers and insects.

It was determined experimentally that Histoplasma grows in the laboratory on sterilized soil with a high humus content. When sterile and moistened soil, containing such organic materials as decayed vegetation and dung, was inoculated with *H. capsulatum*, the fungus sporulated freely, producing characteristic macroconidia.[1] It had been assumed that Histoplasma, if it occurred saprophytically in soil, would be most abundant and easily found in soil with a high humus content, and most samples had been taken from such soil types. From an examination of these two soil specimens alone it is not possible to judge whether the conditions which favor good growth in soil in the laboratory are or are not required under natural conditions.

Attempts to isolate Histoplasma directly by culture from these samples were not successful either by streaking some of the dry soil on Sabouraud agar or by simply incubating the wet soil after the sample for animal inoculation had been withdrawn. All such cultures were heavily overgrown by other microorganisms.

In an effort to demonstrate Histoplasma visually in the specimens, portions of the suspension from different levels were examined microscopically. Search revealed several structures of various types resembling more or less the typical macroconidia of Histoplasma. Some structures observed were obviously pollen grains, others were rough-walled fungus spores apparently belonging to species of Scopulariopsis, Aspergillus, etc. Certain structures appeared to be entirely typical of the macroconidia of Histoplasma (figs. 1–9). There was more variation in the appearance of these macroconidia found in the soil samples than one usually sees in a laboratory culture. Some of the spores were roughened but lacked well-developed appendages which characterize Histoplasma (fig. 2). However, the macroconidia produced in a laboratory culture on Sabauraud agar showed great variation in the size and shape of these appendages (figs. 10–12). It is probable that many of the appendages had been broken off and the spores otherwise damaged by the abrasive action of the dry soil particles. A few typical macroconidia with well-developed and preserved appendages were found (figs. 4–8). In a few cases fragments of hyphae or conidiophores were observed attached to spores, but these were rare. The Histoplasma spores were not numerous in the two specimens, and considerable search was necessary to find them.

[1] There is a lack of uniformity in the designations applied to the large tuberculate spores of Histoplasma. They have been called frequently but incorrectly "chlamydospores." Howell (*13*) used Vuillemin's terminology of "aleuriospores," Negroni (*14*) called them "hypnospores," while Ciferri and Redaelli (*5*) proposed the name "stalagmospores." These spores are large counterparts of the small spores produced by Histoplasma. The walls of small spores are smooth, pitted, or distinctly spiny, whereas the large spores typically are covered with long finger-like projections, although there is great variation in the size, shape, and spacing of these structures. The small spores can be designated properly and most conveniently as "microconidia" and the large spores as "macroconidia." If one wishes to recognize different types of conidia and accepts the validity of Vuillemin's classification of types of conidia both small and large spores may be called aleuriospores.



Figures 1–12. *Histoplasma capsulatum.* 1–9, macroconidia of *H. capsulatum* found in soil; 10–12, macroconidia from a pure culture of one of the isolates from soil.

The strains of *H. capsulatum* isolated by animal inoculation from the two soil samples were similar to each other and quite typical of the species in colony appearance, microscopic morphology and pathogenicity for animals. The macroconidia shown in figs. 10–12 were taken from a culture of one of these strains and were selected to illustrate the variation in size of spores and in the arrangement and shape of the appendages which can be found in these strains as well as in other typical strains of *H. capsulatum.*

This demonstration of macroconidia of *Histoplasma capsulatum* in soil seems to indicate that Histoplasma has an independent saprophytic existence in nature. Although it is possible that its presence in this sample was due to contamination by an infected rat, it is signifi-

cant that macroconidia, which have not been found in animal tissue, were found in the soil sample. It has been shown experimentally that *H. capsulatum* does complete a saprophytic cycle in soil in the laboratory. The experimental data and the actual demonstration of macroconidia in soil in nature make it seem highly probable that *H. capsulatum* goes through a developmental cycle as a saprophyte in soil in nature.

Summary

Histoplasma capsulatum was isolated from 2 of 387 soil samples collected in Virginia. The samples were collected on a farm where 7 of 43 rats trapped had proved histoplasmosis and were taken from soil at the entrance to rat burrows. The strains of fungi are typical of those isolated from human, canine and murine histoplasmosis. Macroconidia, typical of those seen in Histoplasma cultures, were found by direct microscopic examination of saline suspension of the two soil samples.

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A Method of Supplying Cellulose Tape to Physicians for Diagnosis of Enterobiasis

By M. M. Brooke,* A. W. Donaldson,* and R. B. Mitchell**

Numerous workers have pointed out that, because of the egg-laying habits of the female worm, the examination of stool specimens is not a satisfactory technique for the demonstration of infections of the pin worm, *Enterobius vermicularis*. The National Institutes of Health anal swab was developed by Hall (*1*) in order to recover the eggs deposited by the female worm in the perianal region. Some consider the cellulose tape technique proposed later by Graham (*2*) to be more effective (*3*). Because of its simplicity, certain public health laboratories would like to adopt the Graham technique, but they have not had a method of making it available to the physicians wishing to submit specimens. Although the physician may be acquainted with the technique and may wish to comply with the recommendation of the laboratory, he may not have the cellulose tape available when needed and may also lack a suitable container for shipping the preparations to the laboratory. The following is a simple modification of the Graham technique which makes it possible to supply the necessary materials to physicians.

Materials

Clear, transparent cellulose tape (¾ inch wide) is used.[1] A piece of paper ¾ by ½ inch is stuck to one end of a strip of tape approximately 4 inches long. The tape is pressed to the surface of a clean 1-by 3-inch slide and looped over the end so that a small portion adheres to the undersurface of the slide (fig. 1*a*).[2] The end with the attached paper serves as a tab for lifting the tape. A tab also can be made by folding the tape back on itself for approximately one-half inch. The cellulose tape slide preparation can then be placed in a slide container for shipment by the laboratory to the physician (fig. 1*b*).

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[1] The authors used Scotch Brand Cellulose Tape made by the Minnesota Mining & Manufacturing Co., St. Paul, Minn. This, however, does not represent an endorsement of this product by the Public Health Service.

[2] The authors wish to express their appreciation to Raymond Bishop for his valuable assistance in the preparation of the drawings.

Procedure for Using Cellulose Tape Slide

The longer strip of cellulose tape is lifted from the slide by pulling on the paper tab (fig. 1*c*). The short portion of tape on the reverse side of the slide remains attached. The freed section of the cellulose tape is looped over, thus exposing the gummed side (fig. 1*d* and 1*e*). To obtain the specimen, the adhesive side of the tape is touched several times to the exposed perianal region (fig. 1*f*). The tape is then replaced on the surface of the slide (fig. 1*g* and 1*h*). If desired, the name or number of the patient can be written on the paper tab. The cellulose tape slide preparation can be examined or placed in the slide mailing container for shipment to the laboratory.

Alternative procedures can be employed utilizing a test tube (Von Hofe, *4*) or a tongue depressor (Jacobs, *5*). In these the cellulose tape is looped over the end of the tongue depressor (figs. 2*a*, 2*b*, 2*c*, and 2*d*) or of the test tube, which is then used to press the adhesive side of the tape against the perianal region.

In the laboratory the preparation can be examined directly with the 16-mm. objective. Only the portion of the tape that touched the patient needs to be examined. This usually constitutes less than the middle half of the strip of tape and requires less than 10 minutes to cover completely. After the preparation has been examined it can be discarded in a disinfectant solution (e. g., cresol) which will remove the tape and permit the cleaning of the slide.

Discussion

In order for cellulose tape slide preparations to be suitable for public health organizations, it is imperative that the cellulose tape does not deteriorate before it is used by the physician. To test its permanence, a number of cellulose tape slides were stored under various conditions and examined at intervals. Some of the preparations were placed in slide containers and stored at 22° to 25° C. (room temperature), at 37° C. (incubator), and at 5° C. (refrigerator). Other cellulose tape slides were exposed directly to sunlight while at room temperature. The tape preparations which were covered and stored at room temperature or in the incubator have maintained their adhesiveness and clear transparency for over 7 months. Those kept in the refrigerator became slightly milky and less adhesive, while those exposed to direct sunlight became dry and they tore when used.

Since the cellulose tape slide preparations can be stored conveniently at room temperature for long periods, large quantities can be prepared in simple inexpensive kits by public health organizations for future distribution to physicians. These kits might consist of two cellulose tape slide preparations in a double slide container, directions for the

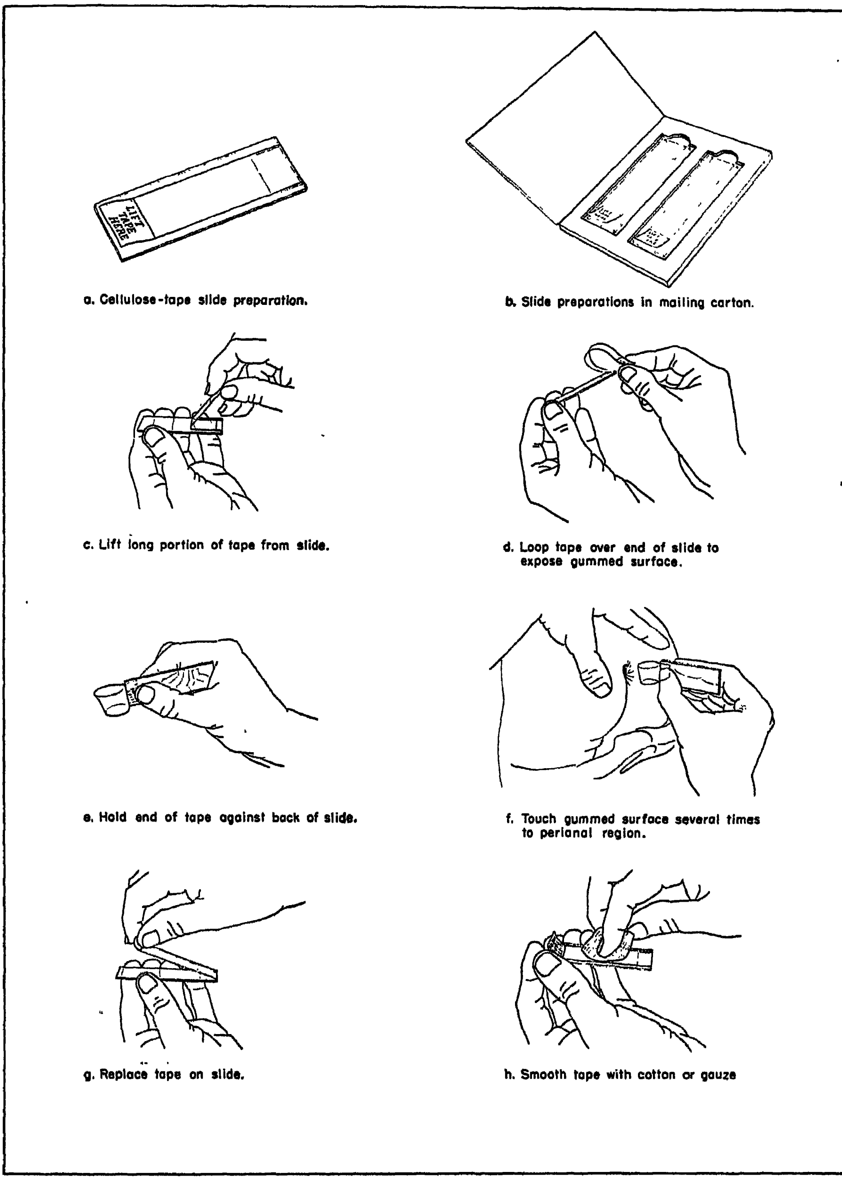

Figure 1. Use of the cellulose tape slide preparation for the diagnosis of enterobiasis.

technique, and a label and container for mailing the preparation to the laboratory. If desired, a tongue depressor can be included for the convenience of the physician.

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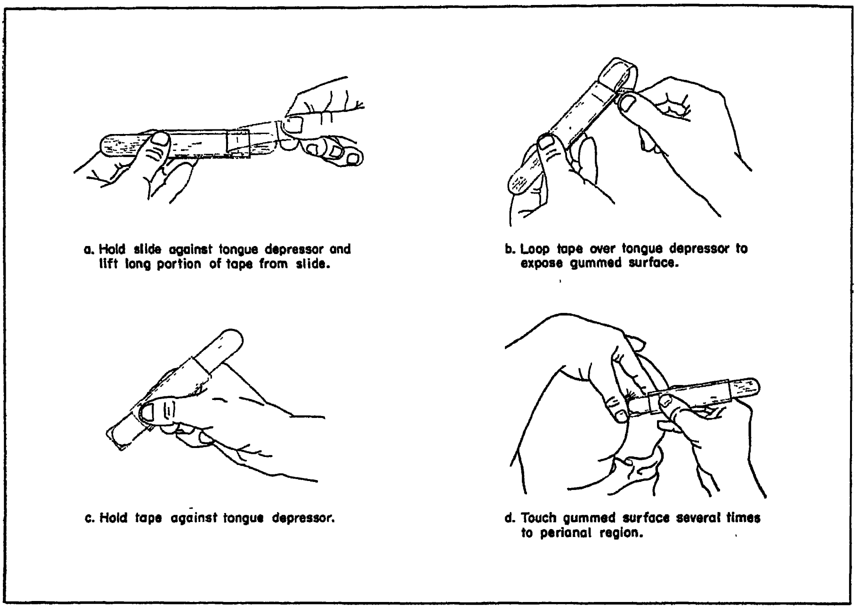

Figure 2. Alternative procedure utilizing tongue depressor to support cellulose tape.

By employing the cellulose tape slide preparation, the physician or a member of the family can obtain the specimen from the patient. Inasmuch as the female worm usually deposits her eggs at night and since children are usually washed thoroughly before being taken to the doctor, specimens obtained in the doctor's office may frequently fail to reveal any eggs. On the other hand, the simplicity of the technique may enable a member of the patient's family to obtain specimens at more favorable times. The mother or father should be given explicit instructions on how to obtain specimens and should be supplied with several of the cellulose tape slide preparations. Since pinworm infections spread easily within a family, it is advisable to obtain specimens from each member of the family, both children and adults. The specimen should be obtained after the individual has retired, perhaps around 10 or 11 p. m., or the first thing in the morning before there has been a bowel movement or a bath.

Summary

A method is described for supplying cellulose tape on microscope slides to physicians for the diagnosis of enterobiasis by the Graham technique. The cellulose tape slide preparation will not deteriorate for several months at room temperature, and therefore can be included

in inexpensive kits suitable for distribution by public health laboratories. Upon instructions from the physician, the parent of the patient can perform the simple technique of taking the specimen in the home at the most favorable time for recovering the eggs.

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DEATHS DURING WEEK ENDED JUNE 18, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended June 18, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,851	8,632
Median for 3 prior years	8,632	
Total deaths, first 24 weeks of year	228,920	232,605
Deaths under 1 year of age	652	669
Median for 3 prior years	646	
Deaths under 1 year of age, first 24 weeks of year	15,584	16,379
Data from industrial insurance companies:		
Policies in force	70,361,365	71,052,571
Number of death claims	12,379	12,237
Death claims per 1,000 policies in force, annual rate	9.2	9.0
Death claims per 1,000 policies first 24 weeks of year, annual rate	9.6	10.0

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 25, 1949

The reported incidence of poliomyelitis increased during the week from a total of 278 cases last week to 409 currently, as compared with an increase for the corresponding week last year from 252 to 309. The 5-year (1944–48) median is 125. Increases occurred in each of the 18 States reporting more than 4 cases each. Reports of the 9 States showing increases of more than 5 cases are as follows (last week's figures in parentheses): Michigan 8 (2), Minnesota 16 (3), Florida 12 (2), Tennessee 10 (3), Alabama 11 (3), Arkansas 42 (14), Oklahoma 47 (29), Texas 113 (106), California 30 (23). No other State reported currently more than nine cases. Of the total of 1,794 cases (last year 1,658, 5-year median 718) reported since March 19 (average seasonal low week), 972 have been reported in 4 States, as follows: Texas 577, California 169, Oklahoma 139, and Arkansas 87.

The incidence of measles declined in all sections of the country except the Mountain area. A total of 10,678 cases was reported, as compared with 14,073 last week and a 5-year median of 7,556. The total for the year to date is 560,865, and the corresponding 5-year median is 504,808.

Of 26 cases of Rocky Mountain spotted fever (last week 25, 5-year median 22), 11 occurred in 4 South Atlantic States, 6 in the Mountain area, 7 in the South Central area, and 1 case each in New Jersey and Illinois. The total to date is 206, 5-year median 153.

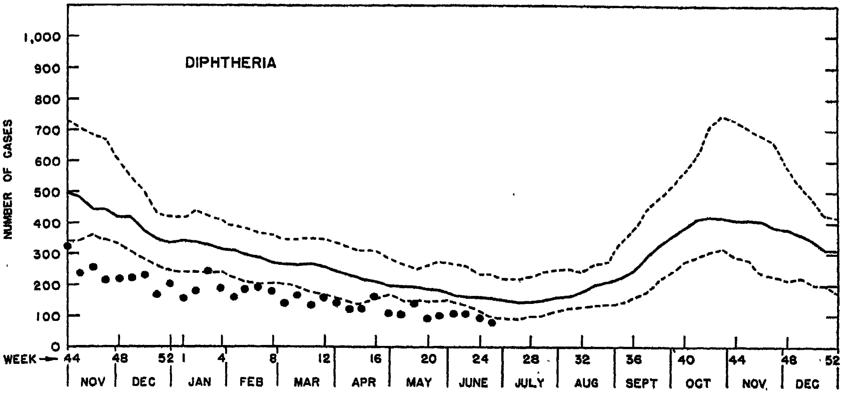
One case of anthrax was reported, in Pennsylvania, and 1 case of smallpox, in New Mexico.

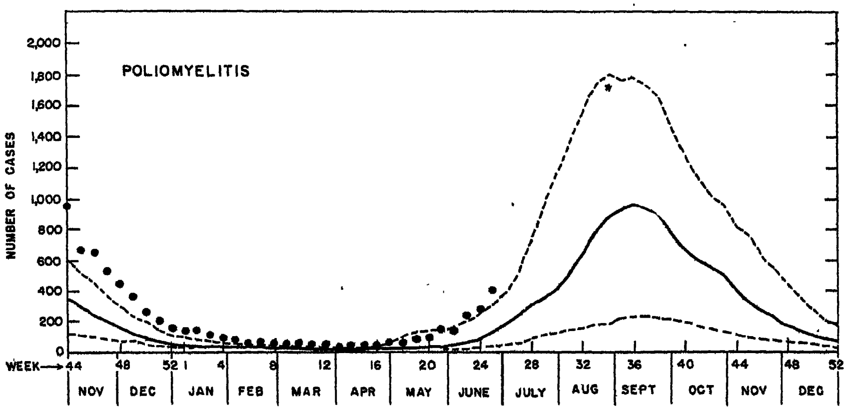
Of the disease included in the table, current and cumulative figures are above the corresponding 5-year medians (not available for pneumonia and rabies in animals) for only poliomyelitis, measles, infectious encephalitis, Rocky Mountain spotted fever, and tularemia.

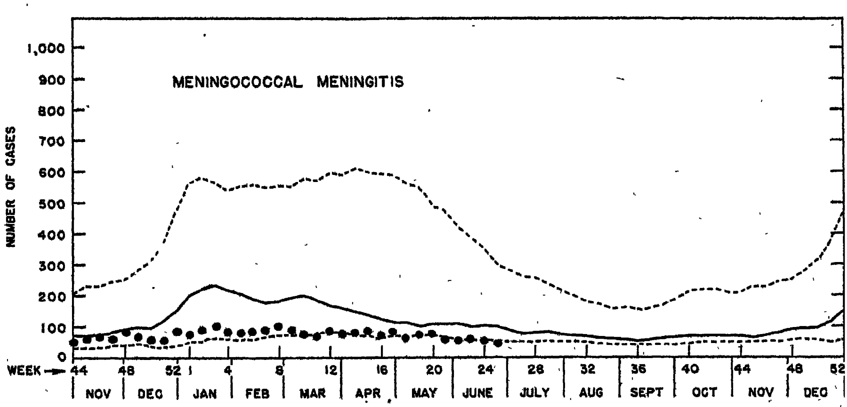
Deaths recorded during the week in 93 large cities in the United States totaled 8,834, as compared with 8,823 last week, 8,554 and 8,642, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,581. The total for the year to date is 236,892, as compared with 240,414 for the same period last year. Infant deaths for the week totaled 579, last week 649, 3-year median 629. The cumulative figure is 16,112, corresponding period last year 16,932.

Communicable Disease Charts

All reporting States, November 1948 through June 25, 1949







The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is a median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1949.

Telegraphic case reports from State health officers for week ended June 25, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	—	—	—	62	—	12	1	—	3	—	—	—	8	—
New Hampshire	—	—	—	25	2	2	—	—	—	—	—	—	2	—
Vermont	—	—	—	52	2	—	—	—	3	—	—	—	—	—
Massachusetts	4	—	—	266	2	—	4	—	64	—	—	1	125	—
Rhode Island	—	—	—	9	—	5	—	—	3	—	—	—	—	—
Connecticut	—	—	—	347	—	19	1	—	13	—	—	—	10	—
MIDDLE ATLANTIC														
New York	4	1	(c)	1,019	3	164	7	—	83	—	—	4	171	5
New Jersey	5	2	1	953	2	40	5	1	23	—	—	—	53	2
Pennsylvania	1	—	(c)	955	1	—	2	—	69	—	—	1	72	1
EAST NORTH CENTRAL														
Ohio	—	—	—	1,044	4	37	—	—	67	—	—	3	46	8
Indiana	4	—	—	71	—	5	2	—	11	—	1	1	18	18
Illinois	—	—	4	396	3	142	3	1	31	—	—	1	85	3
Michigan [a]	1	1	—	457	2	4	8	—	75	—	—	—	26	13
Wisconsin	1	—	2	1,380	—	1	2	—	21	—	—	1	34	—
WEST NORTH CENTRAL														
Minneosta	—	1	—	70	—	12	16	—	9	—	1	—	—	—
Iowa	—	1	—	80	—	2	4	—	1	—	—	—	1	7
Missouri	1	—	1	25	1	5	7	—	4	—	1	1	9	—
North Dakota	—	—	—	5	—	—	9	—	—	—	—	—	1	—
South Dakota	—	—	—	9	—	—	2	—	—	—	—	—	—	—
Nebraska	—	—	—	32	—	—	3	—	3	—	—	—	4	—
Kansas	—	—	3	65	—	4	2	—	3	—	—	—	8	—
SOUTH ATLANTIC														
Delaware	—	—	—	25	—	—	—	—	—	—	—	—	1	—
Maryland [a]	3	—	—	79	—	25	1	3	6	—	—	2	22	—
Dist. of Columbia	—	—	—	21	1	14	—	—	7	—	—	—	—	—
Virginia	7	—	50	212	—	25	1	3	8	—	—	1	44	3
West Virginia	2	—	—	21	—	6	3	—	1	—	—	2	21	—
North Carolina	4	—	—	403	1	—	5	4	5	—	1	4	55	—
South Carolina	5	1	114	255	—	57	3	—	1	—	—	2	32	3
Georgia	2	1	1	110	2	10	2	1	8	—	—	2	—	12
Florida	5	1	14	85	2	7	12	—	—	—	1	1	6	—

EAST SOUTH CENTRAL														
Kentucky	2		6	100	4	14	4	1	11			5	17	17
Tennessee	1		4	94		23	10	2	11		1	2	32	
Alabama	2		2	45	2	27	11	2	6			1	14	6
Mississippi [a]	3		3	17	3	10	9		4			2	16	
WEST SOUTH CENTRAL														
Arkansas	2		9	77		12	42		2		9	3	22	3
Louisiana	1		2	7	1	25	4					5	3	
Oklahoma	1		14	167		22	47	2	5		2	1		3
Texas	14	2	293	224	2	206	113		21		2	11	124	16
MOUNTAIN														
Montana				105			1	1	5			1	2	
Idaho	1		1	68		5	9	1	[d] 6			3	4	
Wyoming				4			1	2						
Colorado			4	127		9	3	2	2			1	8	
New Mexico				61		11	7		3	1			2	
Arizona			29	68		2	3		4			2	4	
Utah [e]			6	59		2			2		2		44	
Nevada														
PACIFIC														
Washington	1			204		2	6		8			1	12	
Oregon	1		3	90	1	14	4		5				16	
California	4		6	628	6	33	30		[d] 40			6	70	2
Total	82	11	572	10, 678	47	1, 015	409	26	657	1	21	71	1, 244	
Median, 1944-48	168	9	631	7, 556	85		125	22	1, 482	4	19	98	2, 052	
Year to date 25 weeks	3, 616	257	73, 674	560, 835	1, 944	49, 170	2, 718	206	56, 128	40	612	1, 219	26, 230	
Median, 1944-48	6, 016	221	187, 745	504, 808	3, 883		1, 123	153	80, 891	240	443	1, 448	49, 049	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32nd) Aug. 14	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	8, 730		109, 944	613, 258	2, 786		1, 794		78, 826	50		759	36, 263	
Median, 1943-48 [b]	13, 582		331, 786	539, 754	5, 387		718		119, 462	323		973	80, 315	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for poliomyelitis and typhoid fever the corresponding periods are 1944-45 to 1948-49, inclusive.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately, as follows: West Virginia 1; South Carolina 1; Tennessee 1; Mississippi 2; Louisiana 2; Texas 3; California 4. Cases reported as Salmonella infection, not included, were as follows: Massachusetts 1; New York 2.

Anthrax: Pennsylvania 1.
Alaska: No cases reported of the diseases listed.
Hawaii Territory: Measles 50; lobar pneumonia 1; poliomyelitis 1.

PLAGUE INFECTION IN COLORADO, MONTANA, AND NEW MEXICO

Under date of June 24, plague infection was reported proved in tissue and ectoparasites of rodents collected in Park County, Colo., Beaverhead County, Mont., and Sandoval County, N. Mex., as follows:

COLORADO

Park County.—A pool of 45 fleas from 1 prairie dog, *Cynomys gunnisoni*, shot June 10 at a location 4½ miles southwest of Fairplay.

MONTANA

Beaverhead County.—A pool of 64 fleas from 39 ground squirrels, *Citellus armatus*, shot June 13 in Small Horn Canyon, 13 miles southwest of Dillon; tissue from 1 ground squirrel, *Citellus richardsonii elegans?*, found dead on a ranch 13 miles west of Dell on Big Sheep Canyon Road and a pool of 244 lice from 58 ground squirrels, same species, shot on the same date at the same location.

NEW MEXICO

Sandoval County.—A pool of 20 fleas from 17 prairie dogs, *Cynomys gunnisoni*, shot June 6 on State Highway 44 within a distance of 7 miles northwest of the town of Cuba.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended June 4, 1949.—During the week ended June 4, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		29		235	448	30	98	61	166	1,067
Diphtheria				4				2		6
German measles		39		218	79	9	72	79	20	516
Influenza		12			3	2			6	23
Measles		7	11	340	364	291	177	531	502	2,223
Meningitis, meningococcal			1		1	2			1	5
Mumps		2		65	296	18	7	23	85	496
Poliomyelitis				2		1		1	1	5
Scarlet fever		2	1	87	73	2	1	9	10	185
Tuberculosis (all forms)		5	18	124	39	29	6	18	31	270
Typhoid and paratyphoid fever			2	8	1		1		4	16
Undulant fever				1						1
Venereal diseases:										
Gonorrhea		2	11	66	54	23	20	25	71	272
Syphilis		7	2	95	27	17	4	9	18	179
Whooping cough				57	17	10	1		1	86

CUBA

Habana—Notifiable diseases—4 weeks ended May 28, 1949.—During the 4 weeks ended May 28, 1949, certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	12		Smallpox	1	
Diphtheria	19		Tuberculosis	3	
Measles	8	1	Typhoid fever	11	1
Poliomyelitis	1		Typhus fever (murine)	1	

Provinces—Notifiable diseases—4 weeks ended May 28, 1949.—During the 4 weeks ended May 28, 1949, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	2	13	17	25	2	14	73
Chickenpox	2	15	1		3	88	109
Diphtheria		19	1	3		5	28
Leprosy		6					6
Malaria	4			1	2	7	14
Measles		9	4	3	3	10	29
Poliomyelitis		1					1
Smallpox		1					1
Tuberculosis	1	16	11	23	15	15	81
Typhoid fever	5	15	4	12	11	24	71
Typhus fever (murine)		1					1
Undulant fever	2					4	6
Whooping cough		6			3	1	10

[1] Includes the city of Habana.

FINLAND

Notifiable diseases—April 1949.—During the month of April 1949, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	13	Poliomyelitis	4
Diphtheria	112	Scarlet fever	295
Dysentery	1	Syphilis	94
Gonorrhea	585	Typhoid fever	17
Paratyphoid fever	146		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma—Bassein.—During the week ended June 4, 1949, 15 cases of cholera were reported in Bassein, Burma.

Plague

Belgian Congo—Costermansville Province.—On June 15, 1949, 1 fatal case of plague was reported northeast of Lubero in the village of Kiamabia, Costermansville Province, Belgian Congo.

Brazil.—Delayed reports: During the month of September 1948, 65 cases of plague with 4 deaths were reported in Brazil, distributed as to States as follows: Bahia State 34 cases, 3 deaths; Pernambuco State 23 cases, 1 death; Ceara State 8 cases, no deaths. For the month of December 1948, 25 cases, 3 deaths were reported, distributed as follows: Bahia State 17 cases, 1 death; Pernambuco State 5 cases; Ceara State 2 cases, 2 deaths; Alagoas State 1 case.

India—Calcutta.—During the week ended June 18, 1949, 27 cases of plague were reported in Calcutta, India.

Peru.—During the period April 1–30, 1949, plague was reported in Peru as follows: In Huacho City, Chancay Province, Lima Department, 3 cases; in Singo Settlement, Huancabamba Province, Piura Department, 3 cases.

Smallpox

Java—Batavia.—During the week ended June 11, 1949, 226 cases of smallpox, with 41 deaths, were reported in Batavia, Java.

Typhus Fever

Bolivia.—For the period February 1–15, 1949, 39 cases of typhus fever, with 7 deaths, were reported in Bolivia, of which 32 cases 7 deaths were stated to have occurred in Potosi Department, where the disease was epidemic.

Yellow Fever

Gold Coast.—Yellow fever has been reported in Gold Coast as follows: On June 1–2, 1949, 1 fatal case in Oseikrome, a village near Sekondi; on April 30, 1 suspected case in Birim District, also 1 suspected case on May 30 in this District. (One of these cases was reported from the "African Selection Trust," and the other from Bawdua, a village located three miles further north).

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 JULY 22, 1949 NUMBER 29

IN THIS ISSUE

Low Mortality in Certain Areas
Notifiable Diseases, First Quarter, 1949

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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CONTENTS

	Page
An investigation of low mortality in certain areas. Theodore D. Woolsey	909
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended July 2, 1949	921
Plague infection in Lincoln County, Wyoming	924
Deaths during week ended June 25, 1949	924
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended June 11, 1949	925
Japan—Notifiable diseases—4 weeks ended May 28, 1949, and accumulated totals for the year to date	925
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Cholera	926
Plague	926
Smallpox	926
Typhus fever	926
Yellow fever	926
Notifiable diseases, first quarter, 1949	927

Public Health Reports

Vol. 64 • JULY 22, 1949 • *No. 29*

An Investigation of Low Mortality in Certain Areas

By THEODORE D. WOOLSEY *

It has been recognized for some time that the lowest general death rates in the United States are found in the West North Central States. South Dakota had the lowest age-adjusted death rate for white persons in 1940. Nebraska was second in this respect with Iowa, Kansas, and North Dakota tying for third place. It might be thought that this geographical concentration of low mortality would disappear when urban and rural death rates are compared separately, since rural rates are considerably lower than urban and the West North Central States all have large proportions of rural population. However, the lowest urban white mortality in the country in 1940 was experienced in Minnesota with Wisconsin second, Nebraska third, Utah fourth, California fifth, and Iowa, Kansas, Massachusetts, and Michigan tying for sixth. Eastern and Far Western States are represented, but the West North Central States, with one exception, are all among the lowest. For rural white mortality, also, all of the States of this geographical division, except Missouri, ranked among the ten lowest in the country on the basis of age-adjusted death rates. In fact, the low level of the rural mortality in this area is more striking than that of the urban mortality. The rural white age-adjusted death rate in the West North Central States in 1940 was 16 percent below the rural rate for the country as a whole, while the urban white rate was 6 percent below the corresponding national figure.

The object of this investigation was to discover whether any set of factors exists which would account for the low rates that have consistently been observed in the rural areas and small towns of the West North Central region. The geographical units studied were counties, and the opportunity to make use of county mortality data was provided by the publication for the first time in 1943 by the National Office of Vital Statistics (at that time a part of the Census Bureau) of a table showing 2-year totals of deaths by age by place of residence for each county and city of over 10,000 population in the United States

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(*1*). The table refers to deaths in the years 1939 and 1940 and consequently presents the frequency of deaths at about the time of the 1940 census.

On the basis of the enumerated population at the time of the census and the deaths in the above mentioned table, age-specific death rates were computed for all the cities in the tabulation and for a systematic 10-percent sample of all the counties. For the particular purpose of this study the counties included in the sample were screened and certain counties were eliminated at the outset. The counties eliminated were as follows:

1. All counties containing a city of 10,000 or more population in 1940.
2. All counties having more than 30 percent of the population living in urban areas in 1940.
3. All counties in which the nonwhite population in 1940 formed 10 percent or more of the total or numbered 10,000 or more.
4. All counties with a population of less than 2,000 in 1940.
5. All counties in which 5 percent or more of the deaths in 1940 occurred in resident institutions.[1]

These counties were eliminated to reduce the number of factors causing variation in the death rate and thus facilitate the study of those which might be responsible for the low rates in the rural part of the West North Central region. While it is well known that a low proportion of nonwhite population, or a low proportion of urban population, is usually associated with lower death rates, it was also known in this case that the essentially rural white character of the populations under particular consideration was not the only cause of the low mortality. Hence, it was desirable to deal with a group of counties that was fairly homogeneous in this respect. It would have been preferable on theoretical grounds to include all types of counties and attempt to establish a control on the factors that were not under study, but this would have made the work exceedingly laborious. The few counties with large numbers of deaths in resident institutions or exceptionally small populations were omitted for fairly obvious reasons.

This process of elimination reduced the original sample of 308 counties to 124. This smaller sample represents, therefore, about 10 percent of the counties having largely rural white populations, excluding the very smallest ones and those containing large resident institutions.

[1] The rules of the National Office of Vital Statistics for allocation of deaths to place of residence provide that deaths in institutions, such as mental institutions, orphanages, homes for the aged, and so forth, where the length of stay is usually long, are not re-allocated to the place of prior residence of the decedent. Hence, certain counties, in which the population of these resident institutions is a considerable proportion of the total, tend to have abnormally high death rates.

The distribution of these counties according to the nine major geographical divisions of the country was as follows:

	Number of all counties [1]	*Number of counties in sample*
United States	3, 090	124
New England	67	4
Middle Atlantic	146	5
East North Central	436	22
West North Central	620	37
South Atlantic	577	8
East South Central	364	15
West South Central	470	17
Mountain	277	14
Pacific	133	2

[1] Includes certain jurisdictions sometimes classified as cities and also certain counties not organized as local governments.

For each of these counties a single index of mortality was computed by (*a*) calculating the annual age-adjusted death rate by the direct method (using the total United States population in 1940 as a standard) for the 2 years 1939 and 1940 combined; (*b*) finding the ratio of the age-adjusted rate to the crude death rate for the same 2 years; (*c*) multiplying the ratio obtained in (*b*) by the crude death rate for the 5-year period 1938–42; (*d*) adjusting the rate thus obtained for under-registration of deaths using the assumption described below.

It was apparent from inspection of the indices of mortality obtained in step (*c*) above that some of the low death rates were simply a reflection of incomplete registration of deaths. The only quantitative basis that exists for estimating the incompleteness of death registration is the information available on birth registration from the 1940 Birth Registration Test, conducted in conjunction with the census. Although nothing is accurately known about the relative completeness of death registration, there is reason to believe that death registration is better than birth registration and that many of the same factors which account for unregistered births in a given area also result in unregistered deaths. Consequently, it was assumed that the proportion of unregistered deaths in any county was one-half of the proportion of unregistered births estimated from the Birth Registration Test (*2*). Under this assumption the proportion of unregistered deaths in the country as a whole would be 3.75 percent, since the proportion for births was found to be 7.5 percent in 1940. Even if the proportion of unregistered deaths is more or less than one-half the proportion for births, a correction based on one-half probably results in a death rate for each county that is highly correlated with the "true" death rate for that county, except where

factors peculiar to death registration are responsible for the lack of completeness.

The factor actually used to correct for under-registration was designed so that its value for the country as a whole would be equal to 1. It therefore took the form:

$$\text{Correction for under-registration} = \frac{96.25}{100 - \frac{1}{2}\,(\text{percent of births unregistered})}$$

For the counties in the sample the value of the under-registration factor ranged from .963 (when no unregistered births had been found in the 1940 test) to a maximum of 1.503. However, it was greater than 1.100 in only 7 of the 124 counties. (Mean of distribution—1.014; standard deviation—.076.)

The final index of mortality was the ratio of the estimated age-adjusted death rate in the county for the years 1938–42 (corrected for under-registration) divided by the death rate in the entire country in 1940. Its value for all counties in the country would be very close to 1.000, and for any given county it is roughly proportional to the estimated age-adjusted death rate of that county.

The strength of the association of the index of mortality with a number of different variables was measured by the method of partial correlation. Some of the variables were discarded on the grounds that they appeared to explain little of the observed variation in mortality. One method that was used to examine new variables was to set up a least-squares linear regression equation on the basis of several variables known to have a significant association with the mortality. The differences between the actual and computed values of the dependent variable were then computed. (These will be termed the "deviates.") The association of these deviates with new variables was then examined either by means of scatter diagrams or zero order correlation coefficients.

It was decided in advance that the question of when to stop would be answered in terms of the original objectives of the investigation. The deviates obtained from a particular set of independent variables would be subjected to an analysis of variance. When an F test indicated that the mean square error between geographical regions was no longer significantly greater than the within-region mean square, then it would be concluded that the association of mortality with these variables was sufficient to explain the low death rates that were being studied. The geographic regions used in this analysis were somewhat more detailed than the 9 for which census statistics are usually shown. With one exception, however, the 14 regions used did not cut across the boundaries of the 9 major divisions. (Counties in Wisconsin were combined with those in Minnesota instead of with those in Ohio, Indiana, Illinois and Michigan.)

Results

It is not necessary to describe in detail all of the independent variables that were investigated. Some were not investigated as thoroughly as others. Hence, the set finally selected is not the only combination that would explain the observed geographic variation. Some were rejected simply because other indices seemed to measure the same thing better. Those rejected were variables measuring per capita retail sales and effective buying income, the proportion of aged persons in the population, the proportion of persons of European stock other than that from northwest Europe, educational status of the population, geographical density of the population, and percentage change in population between 1930 and 1940. Those finally included in the correlation analysis were:

X_2=rural level of living index, 1940 (*3*).

X_3=square root of the proportion of the population of the county in 1930 that was either born in a northwestern European country or born of parents one or both of whom were born in a northwestern European country (*4*).

X_4=percentage of births to residents of the county that were delivered in hospitals in 1939 and 1940 (*5*).

X_5=percentage of workers employed in agriculture in 1940 (*6*).

The rural level of living index (*3*) is described as "the result of an attempt to indicate in simple form the relative level of living in each county of the United States. It deals with the level of living of all rural families, both farm and nonfarm. The index for each county is a weighted average of indexes for rural farm and rural nonfarm families; the two indexes are weighted according to the proportions of the rural population of the county that are rural-farm and rural-nonfarm" (*6*, p. 428).[2] This composite level of living index contains measures of the crowding of the dwelling units, and the level of education, and prosperity of the families living in the county.

Since country of birth of foreign stock was not available by county in the 1940 census, it was necessary to go back to the previous census to obtain the numbers of foreign born and of native born of foreign or mixed parentage according to country of origin. Originally, proportions of persons of other types of foreign stock were included in the analysis, but it appeared that the only factor that seemed to be significantly associated with mortality was the proportion of persons of northwestern European stock, including persons whose families had immigrated fairly recently from Scandinavia, the Low Countries, France, Germany, and the British Isles. The square root of this proportion was more symmetrically distributed throughout the range of values and had a higher degree of linear association with mortality than the proportion itself.

[2] For a description of items included in the index, see this reference. For further detail see reference 3.

It was hoped that the percentage of births occurring in hospitals would measure the availability and utilization of medical facilities—a factor that was not measured in the level of living index. This turned out to be the least useful of the four independent variables.

The percentage of workers employed in agriculture accounted for more of the variation in mortality in these rural counties than did any of the other three variables.

Table 1 shows some of the correlation coefficients that were obtained using this set of variables. A "z"-test for significance indicated that only the two numerically largest 3rd-order correlation coefficients

Table 1. *Results of correlation analysis of mortality index for counties with certain socio-economic measures*

1=index of mortality
2=rural level of living
3=$\sqrt{\text{percent Northwestern European stock}}$
4=percent births in hospitals
5=percent employed in agriculture

r_{ij}	$r_{ij \cdot k}$	$r_{ij \cdot klm}$
$r_{12}=-.32$	$r_{13.2}=-.22$	$r_{12.345}=-.26$
$r_{13}=-.43$	$r_{14.2}=\ \ .06$	$r_{13.245}=-.16$
$r_{14}=-.16$	$r_{15.2}=-.46$	$r_{14.235}=\ \ .14$
$r_{15}=-.37$	$r_{12.3}=-.03$	$r_{15.234}=-.37$
$r_{23}=\ \ .66$	$r_{14.3}=\ \ .12$	
$r_{24}=\ \ .67$	$r_{15.3}=-.32$	
$r_{25}=-.26$	$r_{12.4}=-.21$	
$r_{34}=\ \ .63$	$r_{13.4}=-.33$	
$r_{35}=\ \ .13$	$r_{15.4}=-.40$	
$r_{45}=-.17$	$r_{12.5}=-.41$	
	$r_{13.5}=-.38$	
	$r_{14.5}=-.22$	

could be considered significant. The square of the multiple correlation coefficient ($R^2_{1.2345}$) was equal to .35. It may seem that accounting for only 35 percent of the total variation represents very little gain in knowledge. However, the objective had been established of explaining that variation which was strongly related to geographical location. Hence, it was not necessary and, indeed, it would have been an overwhelming task to examine the scores of available chracteristics of the counties, such as climatological and demographic characteristics, in an attempt to reduce the residual variation still further.

The least-squares regression plane for the regression of X_1 (mortality) on the four variables described above was found to be:

$$X'_1=1.2565-.0023X_2-.0014X_3+.0011X_4-.0038X_5$$

The deviates, $X_1-X'_1$, were grouped into 14 geographic subdivisions of the country. The arithmetic means of these deviates and of X_1, X'_1, and each of the other indices for all the sample counties falling into any one region are shown in table 2. The table suggests that not all of the regional variation was removed by taking account of the linear association of mortality with the four independent variables chosen. However, the only marked departures from the regression plane are the negative deviations for the six Arkansas counties and the positive deviations of the West Coast counties, the latter being of little significance because of the small number of counties in the sample.

Table 2. *Means of indices for sample counties in each of 14 regions*

Regions and States in which sample counties were located	Number counties in sample	Unweighted means of indices [1] for sample counties in each region						
		Rural level of living	$\sqrt{10 \times \text{\% of pop. of N. W. Eur. origin}}$	% births in hosp.	% emp. in agric.	Mortality [2] X_1	Computed mortality [2] X'_1	$X_1-X'_1$
I Me., Vt., Mass.	4	126	21.70	42.76	21.8	.893	.903	−.010
II N. Y., Penn.	5	120	19.88	27.85	27.5	.880	.882	−.002
III Ohio, Ind., Ill., Mich.	19	111	31.43	26.61	48.2	.827	.807	+.020
IV Wis., Minn.	9	126	66.01	50.21	59.3	.711	.708	+.003
V N. Dak., S. Dak.	9	108	57.24	41.43	68.8	.664	.714	−.050
VI Nebr., Iowa, Kans.	16	122	44.81	34.57	56.9	.713	.739	−.026
VII Missouri	6	90	25.65	10.23	55.2	.784	.819	−.035
VIII Va., W. Va., N. C.	8	86	8.30	10.12	46.9	.871	.883	−.012
IX Ala., Tenn.	5	69	5.36	5.81	59.2	.901	.874	+.027
X Kentucky	10	81	7.63	6.92	55.0	.925	.862	+.063
XI Arkansas	6	75	8.33	5.21	64.9	.680	.836	−.156
XII Okla., Tex.	11	104	21.06	29.53	59.0	.825	.800	+.025
XIII Colo., Utah, Mont., Idaho, Wyo.	14	112	40.83	46.30	51.6	.833	.799	+.034
XIV Oreg., Calif.	2	118	33.01	72.49	42.4	.972	.858	+.114

[1] For description of indices, see text. In a later table, weighted means of indices, with county populations as weights, are used.

[2] Note that the mortality index is expressed as a ratio and not as a death rate. The age-adjusted death rate corrected for under-registration of deaths as described in this study can be obtained by multiplying each of these ratios by the United States crude death rate in 1939 and 1940, which was 10.7 per 1,000 population.

The analysis of variance of the county deviates within and between regions is presented in table 3. The results indicate that the remaining geographical variation cannot be explained as a chance result. However, examination of the between-region sum of squares showed that more than one-half of the total sum of squares arose from the six counties in Arkansas (which had been set up as a separate region). All of the deviates for these counties had a negative sign. Arkansas is not among the West North Central States for which the low rural mortality was being investigated, but the mean of the mortality index for these six counties is the second lowest of any of the regions. The regression plane fits the West North Central counties reasonably well but misses badly in predicting the Arkansas counties.

Table 3. *Analysis of variance and test for significance of mortality index for counties with certain socio-economic measures held constant*

	d. f.	Sums of squares	Mean squares
Between regions	13	0. 2893205	0. 0222554
Within regions	110	. 9611423	. 0087377
Total	123	1. 2504628	. 0101664

$$F=\frac{0.0222554}{0.0087377}=2.55^{1}$$

1% point=2.30

[1] If the deviate for each county is weighted by the population of the county, the value of F is reduced to 2 32.

If the six Arkansas counties are omitted from the analysis of variance, a conservative estimate of the between-region sum of squares is obtained without recomputing the regression function, i. e., an estimate which is certainly not lower than that which would have been found had the six counties been omitted at the outset. The revised analysis of variance is shown in table 4.

The mean square estimated from the regional means is not significantly greater than the mean square estimated from within-region variation. It can be said, therefore, that, if the six counties in Arkansas are excluded, the remaining geographical variation is not too great to have arisen as a result of chance.

Table 4. *Revised analysis of variance of table 2 with six Arkansas counties omitted*

	d. f.	Sums of squares	Mean squares
Between regions	12	0. 1355413	0. 0112951
Within regions	105	. 9074890	. 0086428
Total	117	1. 0430303	. 0089148

$$F=\frac{0.0112951}{0.0086428}=1.31^{1}$$

1% point=2.35

5% point=1.85

[1] If the deviate for each county is weighted by the population of the county, the value of F is reduced to 1.19.

Discussion

The only factor that can reasonably be introduced to explain the low mortality in the Arkansas counties is incompleteness of death registration. In other obvious respects these counties are not different from some of the other counties in the sample, except in ways that would appear to make the death rates higher rather than lower. On the other hand, the Arkansas counties were no worse than some other counties as regards birth registration. Hence, it seems most likely that death registration is poor in these counties for some reasons that do not necessarily influence birth registration.

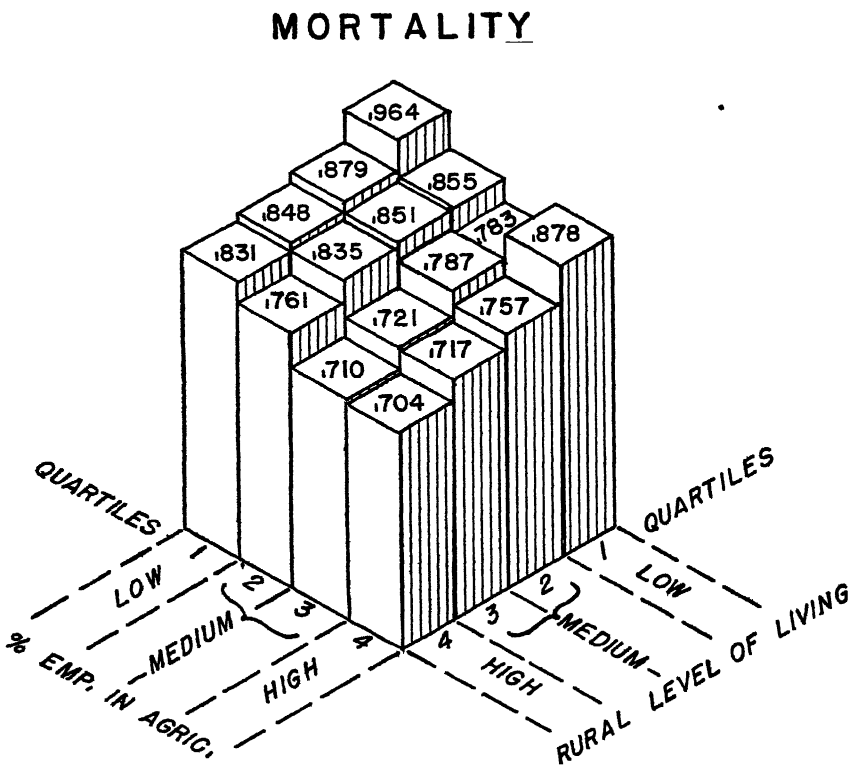
Table 5. *Mortality index in 124 counties distributed according to percent employed in agriculture and rural level of living*[1]

Rural level of living index	Percent employed in agriculture							
	9 2-46 9		47.0-55.9		56 0-61.4		61.5-83 8	
	Mortality index	Frequency and mean[2]	Mortality index	Frequency and mean[2]	Mortality index	Frequency and mean[2]	Mortality index	Frequency and mean[2]
50-91	0 800 .959 .986 1.048	4 .964	0 763 .782 .784 *.802 .916 .937 1.007	7 .855	*0 570 *.708 834 .863 .885 .890	6 .783	*0.535 .647 *.695 *.768 .768 .786 .852 .864 .876 .878 .924 .928 .975 1.066 1.204	15 .878
92-111	0.676 .706 .779 .788 .798 .838 .904 .939 .961 1.000 1.042 1.079	12 .879	0.740 .817 .818 .825 1.088	5 .851	0.673 .720 .752 .768 .786 .794 .803 .886	8 .787	0.546 .655 .717 .747 .867 1.040	6 .757
112-122	0.799 .800 .842 .860 .902 .930 1.016	7 .848	0.689 .689 .693 .731 .759 .779 .815 1.145	8 .835	0 647 .653 .695 .712 .727 .763 .784 .909	8 .721	0.515 .690 .695 .705 .712 .926	6 .717
123-145	0.734 .785 .793 .829 .838 .882 .885 .922	8 .831	0.665 .671 .728 .740 .742 .750 .760 .780 .792 .794 .895	11 .761	0.666 .667 .668 .671 .702 .730 .760 .763 .769	9 .710	0.671 .683 .738 .741	4 .704

[1] Values marked with an asterisk are those for the 6 counties in the sample located in Arkansas.
[2] Weighted mean using populations as weights.

The variables of real importance in explaining the geographic variation of mortality in this sample of 124 rural white counties were: (1) rural level of living, and (2) proportion of working population engaged in agriculture. In each case the association is a negative one. This relationship is more clearly shown in table 5 in which the mortality index for each of the 124 counties is listed according to its quartile position in the distribution of the counties according to rural level of living and percent employed in agriculture. In each cell of the table the weighted mean of the values in that cell is also presented. The weights used were the 1940 populations of the counties. It will be seen that there is a fairly regular downward gradient from left to right and from top to bottom. The six Arkansas counties are marked with asterisks. The chart shows the same relationship graphically.

The negative relationship between living standards and mortality is understandable and, in fact, has been recognized for a long time.



Mortality in 124 rural white counties classified according to high, medium, and low rural level of living and percent of population over 14 years of age employed in agriculture, 1940 (see text for description of mortality index).

The data presented here, however, seem to indicate that in the population of rural areas and small towns the proportion of the population engaged in agriculture is at least an equally important factor in determining the age-adjusted death rate. This investigation does not, of course, show how many intermediate factors, themselves associated with percent employed in agriculture, should be inserted in the causal chain between the farm employment and the death rate. In fact, if all the causes of low and high mortality were known, this particular relationship might prove to be highly artificial. Some light is thrown upon it by a study of life tables for those States with high proportions of farm population contrasted with those having low farm populations, holding constant the median family income or some other measure of living standards. Such data suggest that if the index of mortality for the sample of counties used here had been confined to mortality under, say, 40 years of age, the strength of the association with rural level of living would have increased while the correlation with percent employed in agriculture would actually have been reduced. If, on the other hand, the mortality index had been based upon death rates over age 40, using, for example, the reciprocal of the expectation of life at age 40 as a measure, exactly the reverse would have been true.

If it should prove to be a fact that a particular environment or occupation is conducive to improve expectation of life beyond middle age, the reason for some of the now inexplicable variation in mortality from one area to another would become clear. Since death rates, nowadays, whether age-adjusted or crude, tend to be determined more and more by the age-specific rates at the older ages, some knowledge of the factors influencing these rates would contribute greatly to the usefulness of mortality statistics.

Summary

This study was undertaken in the hope of finding at least a partial explanation of the particularly low mortality that prevails in the rural parts of the West North Central region of the United States. It is pointed out that urban mortality is also low in these States, but the difference is not so marked.

The geographical units studied were counties. Out of the 3,090 counties in the country a sample of 124 was selected, comprising approximately 10 percent of the counties that had in 1940: (*a*) No city of 10,000 or more population; (*b*) not more than 30 percent of the population classified as urban; (*c*) not as much as 10 percent or as many as 10,000 nonwhite population; (*d*) not less than 2,000 population in all; (*e*) not as much as 5 percent of the 1940 deaths occurring in resident institutions. This preliminary elimination of certain types

of counties was made in order to reduce the effect of certain factors having an influence upon mortality that is already well recognized. For this same reason the death rates were age-adjusted, and an attempt was made also to adjust for assumed incompleteness of death registration by using information obtained in the 1940 Birth Registration Test. The final index of mortality used was roughly proportional to the age-adjusted death rates for the sample counties in the period 1938–1942.

The association of these measures of mortality with certain demographic and socio-economic characteristics of the populations of each of the 124 counties in the sample was studied. The plan was to find several factors which would be sufficient to account for the observed geographical differences in mortality. It was found that if two factors, (1) the "rural level of living" (a measure of standard of living in rural areas), and (2) the proportion of workers employed in agriculture, were held constant for each county, the remaining geographical differences could be explained as chance variation. This held true, however, only when the six Arkansas counties in the sample were omitted. The exceptionally low mortality in these counties was thought to be due to under-registration of deaths that was not associated with under-registration of births and, hence, had not been taken into account in the construction of the mortality index.

This study seemed to suggest that the mortality of a rural area is at least as dependent upon the proportion of its workers employed in agriculture as it is upon its standard of living. The question was raised for further study as to whether a high proportion of persons in farm employment might be found to be significantly associated with mortality at the older ages, in contrast with the standard of living which has been generally supposed to have more influence on death rates at the beginning of life.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDING JULY 2, 1949

A total of 479 cases of poliomyelitis was reported, as compared with 409 last week, 362 for the corresponding week last year, and a 5-year (1944–48) median of 220. Of the 22 States reporting more than 4 cases each, 4 showed no increase. The largest increases over last week were reported in Arkansas (42 to 59), Louisiana (4 to 15), Kansas (2 to 13), and Minnesota (16 to 25). The 6 other States reporting increases of 5 or more cases are as follows (last week's figures in parentheses): Massachusetts 10 (4), New York 12 (7); Ohio 6 (0), Indiana 7 (2), Illinois 11 (3), Texas 118 (113). The total reported since March 19 (average week of seasonal low incidence) is 2,273, as compared with 2,020 for the corresponding week last year and a 5-year median of 874.

Of the total of 32 cases of Rocky Mountain spotted fever reported for the week (last week 26, 5-year median 26), 23 occurred in the South Atlantic and South Central areas, 6 in 4 States of the Mountain area, and 1 case each in New Jersey, Pennsylvania, and Ohio.

During the week 2 cases of anthrax were reported in New York State.

Current and cumulative figures are above the corresponding medians for measles, poliomyelitis, infectious encephalitis, Rocky Mountain spotted fever, and tularemia.

Deaths recorded in 94 large cities in the United States during the week totaled 8,979, as compared with 8,877 last week, 8,963 and 8,078, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,079. The total for the year to date is 246,775, as compared with 250,144 for the corresponding period last year. Infant deaths during the week totaled 686, as compared with 583 last week and a 3-year median of 630. The cumulative figure is 16,853, as compared with 17,637 for the same period last year.

Telegraphic case reports from State health officers for week ended July 2, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1	------	------	43	------	------	------	------	3	------	------	------	16	------
New Hampshire	------	------	------	6	------	------	------	------	------	------	------	------	------	------
Vermont	------	------	------	42	------	------	------	------	------	------	------	------	1	------
Massachusetts	7	------	------	240	2	------	10	------	39	------	------	1	106	------
Rhode Island	------	------	------	24	------	2	------	------	2	------	------	------	1	------
Connecticut	------	------	1	342	1	33	3	------	10	------	------	------	13	1
MIDDLE ATLANTIC														
New York	3	4	(c)	1,097	2	164	12	------	[d] 38	------	------	3	190	6
New Jersey	1	1	------	730	1	29	2	1	13	------	------	------	40	------
Pennsylvania	5	------	(c)	649	2	------	2	1	44	------	------	1	57	1
EAST NORTH CENTRAL														
Ohio	1	------	1	515	3	16	6	1	40	------	------	1	68	11
Indiana	9	------	6	22	------	3	7	------	3	------	------	1	8	20
Illinois	------	1	------	286	1	39	11	------	11	------	1	1	89	4
Michigan [a]	2	1	------	320	2	48	10	------	59	------	------	------	28	1
Wisconsin	------	------	2	1,229	------	3	5	------	12	------	1	1	64	------
WEST NORTH CENTRAL														
Minnesota	------	------	------	22	1	5	25	------	10	------	------	------	5	------
Iowa	------	------	------	32	1	2	4	------	1	------	1	------	------	4
Missouri	1	------	1	26	------	7	11	------	8	------	3	4	1	------
North Dakota	------	------	------	4	1	------	6	------	------	------	------	1	2	------
South Dakota	------	------	------	32	------	------	------	------	1	------	------	------	------	------
Nebraska	------	------	2	27	------	------	2	------	14	------	------	------	------	------
Kansas	1	1	1	39	2	4	13	------	5	------	------	------	4	------
SOUTH ATLANTIC														
Delaware	------	------	------	10	------	------	------	------	1	------	------	------	6	------
Maryland [a]	------	------	1	46	------	20	------	1	9	------	------	------	26	------
Dist. of Col	1	------	------	34	------	4	1	------	4	------	------	------	------	------
Virginia	1	------	24	244	------	15	4	7	4	------	1	9	18	------
West Virginia	2	------	------	32	------	------	6	------	4	------	------	2	33	------
North Carolina	3	------	------	128	1	------	3	3	5	------	1	3	27	------
South Carolina	2	------	95	151	------	36	------	1		------	1	------	16	2
Georgia	3	------	24	106	2	133	4	1	3	------	------	7	9	5
Florida	3	------	------	57	------	4	1	------	1	------	------	1	3	2

EAST SOUTH CENTRAL														
Kentucky	3			76	2	2	5	4	6			4	6	9
Tennessee		1	9	67	3	21	10	1	6			5	41	
Alabama	2		5	82	3	23	14		7				11	5
Mississippi [a]		1		22		6		1	5		1	2	7	
WEST SOUTH CENTRAL														
Arkansas	2		8	55	1	20	59		3		8	5	31	6
Louisiana	6			12	1	34	15		1		1	5	4	
Oklahoma	1		6	114		9	51	4	2			1	4	1
Texas	6	1	259	219	8	169	118		9		2	7	157	16
MOUNTAIN														
Montana				81				1	6				7	
Idaho			29	77		6	9		d 15			1	10	
Wyoming				7		17	2	1	2		2			
Colorado			2	26	2	10	2	1	2		1		15	
New Mexico	2		2	7	2	24	4					2		
Arizona			17	67		2	3					4	14	
Utah [a]				48		1	1	3	2		4		28	
Nevada														
PACIFIC														
Washington			10	56		1	7		15				12	
Oregon				63		5	2		7				19	
California	4	1	6	392	4	16	29		d 41			2	44	1
Total	72	12	511	8,006	48	933	479	32	473		28	74	1,241	
Median, 1944-48	159	10	583	6,034	81		220	26	1,223	4	20	111	2,170	
Year to date 26 weeks	3,688	269	74,185	568,871	1,992	50,103	3,197	238	56,601	40	640	1,293	27,471	
Median, 1944-48	6,165	231	188,206	517,296	3,964		1,271	172	82,114	245	471	1,586	50,116	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32d) Aug. 14	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	8,802		110,455	621,264	2,836		2,273		79,299	50		833	37,504	
Median, 1943-48 [b]	13,731		332,369	552,242	5,468		874		120,685	328		1,111	81,382	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for poliomyelitis and typhoid fever the corresponding periods are 1944-45 to 1948-49, inclusive.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately, as follows: North Dakota 1, Virginia 2, West Virginia 1, North Carolina 1, Georgia 1, Arkansas 1, Texas 1, New Mexico 1, California 1. Cases reported as Salmonella infection, not included, were as follows: Massachusetts 2, Pennsylvania 1, New York 3.
Anthrax: New York 2.
Alaska: Streptococcal throat 1, measles 2.
Hawaii Territory: Influenza 2, measles 48.
[1] April onset.

PLAGUE INFECTION IN LINCOLN COUNTY, WYO.

Under date of June 30 plague infection was reported proved in a pool of 45 fleas from 15 ground squirrels, *Cytellus armatus*, and in a pool of 9 fleas from 9 ground squirrels, *Citellus richardsonii elegans*, collected on June 17 at a location 5 miles northeast of Opal, Lincoln County, Wyo.

DEATHS DURING WEEK ENDED JUNE 25, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended June 25, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8, 877	8, 576
Median for 3 prior years	8, 603	
Total deaths, first 25 weeks of year	237, 797	241, 181
Deaths under 1 year of age	583	612
Median for 3 prior years	629	
Deaths under 1 year of age, first 25 weeks of year	16, 167	16, 991
Data from industrial insurance companies:		
Policies in force	70, 388, 886	71, 043, 978
Number of death claims	12, 205	12, 346
Death claims per 1,000 policies in force, annual rate	9. 0	9. 1
Death claims per 1,000 policies, first 25 weeks of year, annual rate	9. 5	10. 0

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended June 11, 1949—During the week ended June 11, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		39	1	208	379	33	105	91	79	935
Diphtheria				11	3					14
Dysentery, bacillary				7					1	8
Encephalitis, infectious									1	1
German measles		38		150	35	7	46	64	27	367
Influenza		38			6	13				57
Measles		46	4	260	299	332	202	462	385	1,990
Meningitis, meningococcal					1	1				2
Mumps		43		76	237	16	3	11	86	472
Poliomyelitis				2		1			1	4
Scarlet fever				55	58	3	1	14	8	139
Tuberculosis (all forms)		1	6	131	26	12	12	14	19	221
Typhoid and paratyphoid fever				6	1				2	9
Undulant fever				2	1					3
Venereal diseases:										
Gonorrhea		8	9	89	60	18	12	19	67	282
Syphilis		8	4	58	44	4	1	8	16	143
Whooping cough				77	32	8			6	123

JAPAN

Notifiable diseases—4 weeks ended May 28, 1949, and accumulated totals for the year to date.—For the 4 weeks ended May 28, 1949, and for the year to date, certain notifiable diseases have been reported in Japan as follows:

Disease	4 weeks ended May 28, 1949		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	1,071	97	7,602	788
Dysentery, unspecified	547	149	1,375	364
Encephalitis, Japanese "B"			1	
Gonorrhea	15,098		76,550	
Influenza	404		1,617	
Malaria	411	6	925	21
Measles	35,728		95,657	
Meningitis, epidemic	121	27	693	175
Paratyphoid fever	130	2	678	24
Pneumonia	14,419		81,035	
Scarlet fever	481	12	2,074	35
Smallpox	54	6	95	10
Syphilis	16,860		86,510	
Tuberculosis	42,144		184,242	
Typhoid fever	356	47	1,837	242
Typhus fever	7	1	83	4
Whooping cough	9,165		33,942	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma.—During the week ended April 23, 1949, 30 cases of cholera, with 2 deaths, were reported in Burma.

Plague

British East Africa—Kenya.—During the week ended May 21, 1949, 1 case of plague was reported in the Fort Hall District, Kenya, British East Africa.

India—Calcutta.—During the period May 29–June 18, 1949, 68 cases of plague with 6 deaths were reported in Calcutta, India.

Smallpox

Arabia—Aden.—Information dated June 28, 1949, states that on June 27, three cases of smallpox were landed at the port of Aden, Arabia, from a ship that left Batavia June 15 for Holland. The next port of call was said to be Suez.

Australia—Fremantle.—Information dated June 16, 1949, states that the steamship "Mooltan" arrived at Fremantle, Australia, on May 27 from United Kingdom, via Bombay and Colombo, with 1 case of modified smallpox on board. The patient and all contacts were quarantined.

Java—Batavia.—For the week ended June 18, 1949, 226 cases of smallpox were reported in Batavia, Java.

Nigeria—Lagos.—During the period June 1–18, 1949, 34 cases of smallpox with 4 deaths were reported in Lagos, Nigeria.

Spain—Canary Islands.—During the period May 1–21, 1949, 6 cases of smallpox were reported in the Canary Islands.

Typhus Fever

Belgium.—Four cases of endemic typhus fever were reported in the Brussels area, Belgium, during the week ended June 18, 1949.

British East Africa—Nyasaland—Zomba.—During the week ended June 4, 1949, 4 cases of typhus fever were reported in Zomba, Nyasaland, British East Africa.

Yellow Fever

No reports of yellow fever were received during the current week.

Notifiable Diseases, First Quarter, 1949

The figures in the following table are the totals of the monthly morbidity reports received from State health authorities for January, February, and March 1949, and show the numbers of cases reported by the required reporting sources in the respective States. They are preliminary and are subject to correction by final reports. They may be assumed to represent the civilian population only, although in some instances a few cases in the military population may be included. The comparisons made are with similar preliminary reports; but owing to population shifts in many States since the 1940 census, the figures for some States may not be comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State, although some do not do so. The list of diseases required to be reported is not the same for each State. Only a few of the common communicable diseases are notifiable in all the States. In some instances cases are reported, in some States, of diseases that are not required by law or regulation to be reported and the figures are included although manifestly incomplete. There are also variations among the States in the degree of, and checks on, the completeness of reporting of cases of the notifiable diseases; therefore comparisons as between States may not be justified for certain diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as cancer, puerperal septicemia, rheumatic fever, and Vincent's infection, are not reportable. However, the figures are recorded as reported.

In spite of these and other deficiencies inherent in morbidity reporting, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating trends by providing a comparison with similar preliminary figures for prior years. The table gives a general picture of the geographic distribution of certain diseases, as the States are arranged by geographic areas.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated Monthly State Morbidity Reports for January, February, and March, 1949

Division and State	Anthrax	Chickenpox	Conjunctivitis [1]	Diphtheria*	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria [2]	Measles*	Meningitis, meningococcal*	Mumps	Ophthalmia neonatorium	Pellagra	Pneumonia, all forms
NEW ENGLAND																		
Maine	------	1,309	------	15	1	------	------	3	121	------	37	1	5,713	4	1,552	------	------	235
New Hampshire	------	543	------	4	------	------	------	------	175	------	30	------	1,126	5	569	------	------	49
Vermont	------	1,047	------	1	------	------	------	------	161	------	------	------	4,499	5	918	------	------	30
Massachusetts	3	11,959	------	109	1	5	------	4	1,240	------	------	------	17,861	18	4,723	42	------	------
Rhode Island	------	627	------	4	1	------	------	------	9	------	------	------	4,876	5	1,191	------	------	114
Connecticut	------	6,025	29	9	8	2	------	3	411	1	150	1	5,304	13	5,438	------	------	861

See footnotes on page 932.

Consolidated Monthly State Morbidity Reports for January, February, and March, 1949—Continued

Division and State	Anthrax	Chickenpox	Conjunctivitis [1]	Diphtheria*	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria [1]	Measles*	Meningitis, meningococcal*	Mumps	Ophthalmia neonatorum	Pellagra	Pneumonia, all forms
MIDDLE ATLANTIC																		
New York	9	14,762	4	73	162	66		6	[3] 4,526	[3] 21	[3] 49	6	21,344	67	[3] 5,139	7		4,134
New Jersey		24,513		30	20	1		1	3,208		53	2	10,027	28	3,831	4		1,156
Pennsylvania	4	17,273		132	5			4	677		46		21,407	97	4,712	6		1,462
EAST NORTH CENTRAL																		
Ohio		10,091		83	4	2	1		681		31	5	2,221	37	3,791	105		637
Indiana		1,766	24	99	5			9	167		226	1	1,221	14	540			294
Illinois		9,227	34	30	58	23		7	2,061		196	[4] 1	972	58	3,383	25		1,812
Michigan		11,479	245	26	149	39		1	1,150	16	72		7,029	34	3,158	1		693
Wisconsin		12,552		8	2			5	1,738		771		13,483	38	5,390			[5] 158
WEST NORTH CENTRAL																		
Minnesota		1,700	3	49	11	2	1				7	[6] 10	1,038	21				171
Iowa		1,663		9	1		1	2	13				324	10	1,638			34
Missouri		1,659	3	30			5	1	2		91	2	5,380	31	435			374
North Dakota		327	5	3							107		679	4				203
South Dakota		299		4							4		189	4	209			7
Nebraska		623		5	1						76		637	2	1,380			45
Kansas	1	2,137	87	32		1		1	414		93		10,392	10	1,156			20
SOUTH ATLANTIC																		
Delaware		313		10							1		199	5	52			6
Maryland		1,929	8	28	4		8	2	425		30	2	13,695	16	353	3		540
District of Columbia		858		14	1	9							882	7				179
Virginia		2,536		42			884	2			4,750	2	9,969	29	1,384		4	1,501
West Virginia		550		28					281		870		2,045	17	331	28		177
North Carolina				86	4	6		1				8	6,613	24				
South Carolina		1,026		80	12	77		4	283	411	7,971	32	2,081	18	952	9	120	2,412
Georgia		1,252	4	39	5	33	2	2		1,213	244	14	4,163	24	1,273		5	534
Florida		1,120		80	28	24		1	13	1,257	116	19	1,263	8	494	2		225

EAST SOUTH CENTRAL																		
Kentucky		1,001	56	67	1	3		3	569	13	230	8	4,659	58	1,585			668
Tennessee		1,089		56	27	8	5	3	61	2	1,015	2	3,225	49	920	6	7	1,052
Alabama		1,104		101	5				39		1,384	11	6,493	20	560		5	932
Mississippi				69	24	6		5		1,383		5	892	18		5		427
WEST SOUTH CENTRAL																		
Arkansas		874		50	68	18	90		196	2	3,014	14	6,739	10	822		3	1,342
Louisiana		359		46	217	3		1	14	133	109	10	694	15	347	3	1	496
Oklahoma	1	839		42	53		7		145	9	911	10	2,936	18	1,056	1	12	617
Texas		13,637		276	128	3,831	1,993	1				522	34,909	98	5,582	31		6,380
MOUNTAIN																		
Montana		999	30	11				1	636		114		649	5	224			56
Idaho		518	19	19			146		251		127	2	918	2	990			131
Wyoming		257		5	1			2	161		1		225	1	379			36
Colorado		2,339		32	2	13		5	458		591		3,798	14	1,084			472
New Mexico		518	3	15	2	3	1	1	54		34		2,628	2	243	3		289
Arizona		1,047		54	15	89	20	1	359		1,933	4	1,729	3	320		1	453
Utah		1,316		[7] 20		[7] 3			175		57		1,167		686			70
Nevada		104	4	1							31		231	3	11			28
PACIFIC																		
Washington		4,411	88	13	5	5	577	2	1,098		1,097	1	5,652	24	2,217			360
Oregon		1,242	66	13	28	2							6,456	7	1,161	1		488
California		20,239		139	92	77		17	8,901		500	[6] 8	20,288	106	14,923	2		[5] 569
Total	18	193,168	712	2,191	1,151	4,351	3,741	101	30,873	4,461	27,169	703	280,920	1,106	87,102	284	158	33,118
First quarter, 1948	19	138,372	505	2,724	802	3,387	2,863	117	4,981	4,421	128,825	1,316	196,697	[8] 1,114	91,250	226	297	33,719
Median 1944-48	14	133,938	505	3,655	682	4,336	1,591	113	11,076	4,142	213,750	6,378	196,697	2,512	61,511	330	854	40,814
Alaska		73							39		68		38	1	185			11
Hawaii Territory		747	3	9	2	11			103	1	1,910		3,900		411			[5] 19
Panama Canal Zone [9]		88		12	21	8			1			306	6	10	6			[10] 29

See footnotes on page 932.

Consolidated monthly State morbidity reports for January, February, and March, 1949—Continued

Division and State	Poliomyelitis*	Rabies in man	Rheumatic fever	Rocky Mountain spotted fever	Scarlet fever*	Septic sore throat	Smallpox*	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms*	Tuberculosis, respiratory	Tularemia	Typhoid fever*	Paratyphoid fever	Typhus fever, endemic	Undulant fever*	Vincent's infection	Whooping Cough*
NEW ENGLAND																			
Maine			1		284	23				2	150	134							101
New Hampshire					132	28					46						1	8	105
Vermont	2				122	4									2		3	26	137
Massachusetts					3,541	40		2	3	11	611	577	1	4	7		12		872
Rhode Island			21		178	5				1	131	79					3	5	81
Connecticut					593	201		2		8	380	366			1		33		74
MIDDLE ATLANTIC																			
New York	17				[11] 3,128	(12)		2		29	3,926	3,672	1	18	[13] 25		42		1,644
New Jersey	38				1,884	67		1		6	834			7	3		11		631
Pennsylvania	11		279	9	3,150					4	1,293		3	42	[13] 3	1	19		892
EAST NORTH CENTRAL																			
Ohio	8		45		4,417	13	2	2		8			2	19			35	11	681
Indiana	10		6		928	10			1		703	653	7	11	1		5		265
Illinois	10		22		2,427	43		4	1	1	1,715	1,610	18	17			109	45	446
Michigan	24		205		4,675	551	1	3			1,224			9	[13] 8	2	43		464
Wisconsin	10				948	169			2		546		4	2	1		70		470
WEST NORTH CENTRAL																			
Minnesota	40		18		912	64		4			299			1	[13] 1		69		24
Iowa	12		1	2	464	3				27	161		2	1			63		50
Missouri	13		5		478	9	4	1	97		577		24	16	1		17		67
North Dakota	4		5		138	6		1			47	45						7	76
South Dakota	21				56	1			1		77			1			3		15
Nebraska	14		1		[11] 172	(12)					87			1			8	1	42
Kansas	15		1		415	5	1		3		184	183	6	3			31	17	49
SOUTH ATLANTIC																			
Delaware	3				162						92	92		1					14
Maryland	5		37		425	27		1			828	468		9	[13] 4		10	1	122
District of Columbia					113			1					1	3	1				42
Virginia	8		4		239	605					793	770	7	12	2		14		357
West Virginia	13		4		303	39					546	544		10					224
North Carolina	29			4	286	13					950	904	30	9	6	11	9		331
South Carolina	15		73		92	2,221		2			122		33	12	3	5	13		323
Georgia	8		22		176	63		5			540	532	61	16	5	27	25	3	58
Florida	15				80	49		15	8		951	951	5	13	[13] 43	25	29	29	91

EAST SOUTH CENTRAL																			
Kentucky	6	-	22	1	740	22	1	-	45	-	602	581	4	32	-	-	4	-	477
Tennessee	8	-	30	2	562	137	-	4	-	-	1,177	-	39	19	-	10	13	45	167
Alabama	14	-	-	1	203	-	-	3	-	-	767	-	5	5	3	28	18	-	160
Mississippi	11	-	23	-	60	-	-	3	-	-	624	601	31	18	-	-	12	-	80
WEST SOUTH CENTRAL																			
Arkansas	11	-	7	1	69	284	-	2	13	-	502	494	8	19	-	-	7	-	120
Louisiana	10	1	11	-	76	10	1	6	-	-	746	713	23	36	6	5	6	-	40
Oklahoma	4	-	58	-	178	121	-	1	50	-	395	387	14	16	-	2	27	32	38
Texas	112	-	-	-	471	1,014	6	-	8	11	2,042	-	17	43	6	63	92	-	1,509
MOUNTAIN																			
Montana	6	-	-	-	222	48	-	-	-	-	154	154	3	3	-	-	5	-	20
Idaho	15	-	12	-	98	156	2	-	-	-	63	-	-	5	1	-	7	10	24
Wyoming	-	-	25	2	97	-	-	-	-	-	14	14	3	-	1	-	3	1	4
Colorado	3	-	39	-	227	98	-	1	2	-	323	-	-	4	4	-	18	7	113
New Mexico	1	-	8	-	183	8	-	1	12	-	[7] 378	[7] 355	1	6	-	-	5	-	44
Arizona	15	-	63	-	81	347	-	-	39	-	533	518	2	8	1	-	4	-	165
Utah	[7] 17	-	7	-	70	3	-	-	1	1	[7] 38	[7] 37	4	-	-	-	[7] 27	-	201
Nevada	-	-	-	-	15	31	-	-	2	-	14	-	-	-	-	-	-	3	2
PACIFIC																			
Washington	49	-	105	-	736	73	-	-	1	-	728	-	-	2	-	-	9	43	138
Oregon	18	-	25	-	215	92	-	-	1	-	216	203	-	4	-	-	-	-	245
California	330	-	185	-	1,388	214	-	7	2	2	2,294	2,114	1	29	10	-	19	-	761
Total	975	1	1,370	22	36,609	6,917	18	74	292	111	29,423	17,751	360	486	[13] 149	179	953	294	13,056
First quarter 1948	[8] 410	3	1,220	5	30,843	5,581	31	76	428	98	30,638	[8] 16,809	237	416	197	184	1,170	[8] 659	28,897
Median 1944–48	416	3	1,220	5	44,899	3,173	130	68	502	130	29,726	16,809	242	466	110	548	1,111	605	28,897
Alaska	-	-	3	-	8	60	-	-	-	-	128	119	-	-	-	-	-	-	1
Hawaii Territory	11	-	4	-	4	3	-	-	-	-	182	165	-	-	-	3	1	-	14
Panama Canal Zone [9]	4	-	-	-	-	-	-	4	-	-	[10] 14	-	-	7	2	-	-	-	-

See footnotes on page 932.

Footnotes for table on pages 927 to 931

*Diseases marked with an asterisk (*) are reportable by law or regulation in all the States, including the District of Columbia. Typhoid fever is reportable in all the States; paratyphoid fever in all except 6 States. Syphilis is reportable in all the States and the District of Columbia but is not included in the table. Some States have increased and some have reduced the list of reportable diseases since the latest published compilation of reportable diseases (Pub. Health Rep. 59:317-340, Mar. 10, 1944. Reprint No. 2544).

1 Includes cases of kerato- and suppurative conjunctivitis and of pink eye.
2 In a few States practically all cases contracted outside continental United States.
3 New York City only.
4 Exclusive of artificially induced malaria.
5 Lobar pneumonia only.
6 Exclusive of cases acquired by blood transfusion.
7 Includes nonresident cases.
8 Figures corrected by later reports.
9 Includes the cities of Colon and Panama.
10 In the Canal Zone only.
11 Includes septic sore throat.
12 Included in scarlet fever.
13 Includes cases reported as salmonella infection.

The following list includes certain rare conditions, diseases of restricted geographical distribution, and those reportable in or reported by only a few States; last year's figures in parentheses (where no figures are given, no cases were reported last year, or the disease was not included in last year's published tabulation).

Actinomycosis: Rhode Island 1, Michigan 1, Minnesota 1, Georgia 1, Nevada 1 (3).
Botulism: New Jersey 1 (3), Oklahoma 1.
Cancer: Pennsylvania 1,657, North Dakota 93 (142), Kansas 732 (855), South Carolina 226 (443), Georgia 68 (62), Florida 527 (450), Kentucky 12, Tennessee 973 (601), Alabama 916 (727), Arkansas 146 (146), Louisiana 539 (523), Montana 204 (89), Idaho 180 (217), Wyoming 173, Colorado 787, New Mexico 146 (165), Utah 48 (95) includes nonresidents.
Coccidioidomycosis: New Mexico 1, Arizona 15, California 18 (13).
Colorado tick fever: Colorado 3.
Dengue: Texas 14.
Dermatitis: New Hampshire 4 (4), Missouri 7 (16), Kentucky 1 mycotic dermatitis.
Diarrhea: Connecticut 4 (1), New York 20 (15), Pennsylvania 21 (55), (includes gastro-enteritis) Ohio 119 (54) (includes enteritis), Indiana 1 (8), Illinois 33 (16), Michigan 63 (32), Minnesota 5, North Dakota 2, Maryland 10 (7), South Carolina 2,759 (2,772), Florida 37 (82), Oklahoma 1, New Mexico 26 (9), Utah 1, Washington 3, California 14 (63), Alaska 12.
Dog bites: Massachusetts 2,264, Pennsylvania 1,065, Illinois 2,369 (2,182) all animal bites, Michigan 1,393 (1,288), Arkansas 132 (102) all animal bites.
Encephalitis (other forms): Rhode Island 11, Ohio 1, Michigan 12, Maryland 1, Kentucky 2, Idaho 4, Colorado 4.
Erysipelas: Vermont 1, Massachusetts 2, Connecticut 8, Pennsylvania 12, Ohio 7, Indiana 7, Illinois 54, Michigan 38, Wisconsin 20, Missouri 1, North Dakota 1, Nebraska 2, Kansas 3, Maryland 1, Florida 9, Tennessee 8, Arkansas 3, Louisiana 4, Montana 2, Idaho 1, Colorado 12, New Mexico 1, Utah 2 includes nonresidents, Washington 11, Oregon 18, Alaska 1, Hawaii Territory 5.
Favus: Kentucky 1 (5).
Filariasis: Nevada 1.
Food poisoning: Connecticut 3, New York 121, Ohio 1, Indiana 1, Illinois 49 (6) includes cases reported as food infection, Minnesota 327 (43) includes cases reported as food infection, Louisiana 1 (2), Oklahoma 8, Idaho 2 (5), Colorado 2 (300), New Mexico 3, Nevada 2 includes cases reported as food infection, Oregon 3 (1), California 143 (25).
Granuloma inguinale: Nebraska 1, Florida 280 (88), Kentucky 2 (4), Tennessee 14 (13), Mississippi 34 (88), Louisiana 36 (53).
Impetigo contagiosa: New York 28, Ohio 101 (9), Indiana 5 (15), Illinois 7 (6), Michigan 282 (345), North Dakota 9 (41), Kentucky 44 (4), Montana 10 (3), Idaho 23 (35), Wyoming 2 (11), Colorado 25 (49), Nevada 42 (50), Washington 243 (366), Alaska 4, Hawaii Territory 19.
Jaundice (including hepatitis and Weil's disease): Maine 8 (1), New Hampshire 1 (2), Rhode Island 17, Connecticut 2, New York 110 (61), Pennsylvania 104 (15), Ohio 1, Illinois 6 (3), Michigan 10 (5), Minnesota 10 (29), Maryland 5 (1), South Carolina 2, Kentucky 6 (3), Tennessee 2 (7), Louisiana 1, Montana 6 (1), Idaho 2, Arizona 1, Nevada 1, Washington 8 (1), Oregon 6 (3), California 148 (30), Alaska 1, Hawaii Territory 14 (5), Panama Canal Zone 7 (8).
Leprosy: New York 1 (3), Ohio 1, Mississippi 1, Texas 3 (1), California 3 (5), Hawaii Territory 8 (8), Panama Canal Zone 1 (1).
Lymphocytic choriomeningitis: Massachusetts 2, Indiana 1, Minnesota 1, Iowa 1, Tennessee 4 (2) choriomeningitis undefined.
Lymphogranuloma venereum: Connecticut 1 lymphogranuloma undefined, Nebraska 2 lymphogranuloma undefined, West Virginia 1, Florida 49 (28), Tennessee 18 (19), Mississippi 43, Louisiana 10 (40), Arizona 2 lymphogranuloma undefined, Alaska 1.
Mononucleosis: Vermont 1, Connecticut 28 (4), Ohio 2, Michigan 37 (35), Minnesota 111 (43), Maryland 2 (4), South Carolina 5, Tennessee 17 (4), Oklahoma 1, Montana 1 (1), Idaho 10 (7), Arizona 2, Washington 6.
Psittacosis: New York 1 (1), Illinois 1, Minnesota 1, Maryland 2, Virginia 2, Alabama 1, Washington 1, California 1.
Puerperal septicemia: Pennsylvania 5, Indiana 1, Maryland 1, Mississippi 2 (2), Arkansas 1 (1), Louisiana 1, Nevada 2.
Rabies in animals: New York 78 (165), Ohio 228 (156), Indiana 232 (183), Illinois 28 (29), Michigan 33 (51), Wisconsin 5, Iowa 52 (5), Kansas 1 (6), Virginia 20 (55), South Carolina 44 (59), Georgia 137, Florida 22 (156), Kentucky 102 (30), Alabama 93 (107), Arkansas 27 (26), Louisiana 4 (12), Oklahoma 52 (18), Texas 330 (316), Colorado 2 (1), Arizona 6 (9), California 66 (105).
Relapsing fever: Texas 7 (13), Panama Canal Zone 1 (2).
Rickettsialpox: New York (City) 23 (12).
Ringworm disease (including ringworm of the scalp): Connecticut 55 (61), Ohio 15 (24), Indiana 92 (49), Illinois 442 (824), Michigan 508 (446), Minnesota 1 (17), Iowa 7, Missouri 9 (34), Kansas 11 (22), Virginia 524, Georgia 93, Kentucky 421 (8), Arkansas 2, Oklahoma 35, Montana 1 (6), Idaho 19 (10), New Mexico 2, Utah 2 (21), Nevada 3 (3), Washington 235 (219), Oregon 27.
Scabies: Vermont 4, Rhode Island 2 (3), Ohio 36 (34), Indiana 13 (9), Michigan 274 (369), Missouri 3 (9), Nebraska 1, Kansas 10 (21), Maryland 2, Kentucky 287 (30), Montana 29 (24), Idaho 64 (40), Wyoming 6 (2), Nevada 10 (13).
Schistosomiasis: New York (City) 15 (7).
Silicosis: Arkansas 1, Idaho 3, New Mexico 1.
Yaws: Panama Canal Zone 6.

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.
Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 JULY 29, 1949 NUMBER 30

IN THIS ISSUE

Transmission of *S. enteritidis* by Rat Fleas

Field Trials of Molluscacides

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CONTENTS

Page

Transmission of *Salmonella enteritidis* by the rat fleas *Xenopsylla cheopis* and *Nosopsyllus fasciatus*. C. R. Eskey, Frank M. Prince, and Frank B. Fuller ... 933

Preliminary field trials with laboratory-tested molluscacides. M O. Nolan and E. G Berry ... 942

INCIDENCE OF DISEASE

United States:
- Reports from States for week ended July 9, 1949 ... 950
- Plague infection in Beaverhead County, Mont ... 953
- Deaths during week ended July 2, 1949 ... 953
- Territories and possessions:
  - Panama Canal Zone—Notifiable diseases—May 1949 ... 954
  - Puerto Rico—Notifiable diseases—4 weeks ended June 25, 1949 ... 954

Foreign reports:
- Canada—Provinces—Notifiable diseases—Week ended June 18, 1949 ... 955
- World distribution of cholera, plague, smallpox, typhus fever, and yellow fever—
  - Cholera ... 955
  - Plague ... 956
  - Smallpox ... 957
  - Typhus fever ... 958
  - Yellow fever ... 959

Public Health Reports

Vol. 64 • JULY 29, 1949 • *No. 30*

Transmission of *Salmonella enteritidis* by the Rat Fleas *Xenopsylla cheopis* and *Nosopsyllus fasciatus*

By C. R. Eskey, M. D., Frank M. Prince, B. S., and Frank B. Fuller, M. S.*

During the course of culturing flea feces to determine the presence of plague infection, it was discovered that a number of fleas were excreting *Salmonella enteritidis* (Gaertner), which had invaded the laboratory mouse colony. This accidental infection of the fleas initiated this study.

Varela and Olarte (*1*) state that they were able to infect *Pulex irritans* Linnaeus, and *Ctenocephalides canis* (Curtis) by feeding them on *S. enteritidis* infected mice, but failed to transmit the disease with these ectoparasites. Parker and Steinhaus (*2*) report that they infected ticks, *Dermacentor andersoni* Stiles, with *S. enteritidis* and that these arachnids were capable of transmitting the infection to guinea pigs. Body lice removed from patients were found infected with *S. enteritidis*, according to Huang, Chang, and Lien (*3*).

Infecting Fleas

The white mouse proved to be a very desirable animal to use for infecting fleas with *S. enteritidis*. Of several procedures used to infect mice, the most satisfactory method and the one adopted in the tests was the subcutaneous inoculation of 0.1 cc. of a 5 cc., 24-hour tryptose hormone broth culture. Intraperitoneal inoculation was not satisfactory because most of the animals died from the local reaction. Mice infected with contaminated drinking water were unsuitable because of the irregularity with which septicemia appeared. In one instance, satisfactory results were obtained by feeding fleas on a mouse which was infected by the bites of fleas, thus demonstrating that the infection can be transmitted from mouse to mouse by fleas.

Fleas used in the experiments were bred in the laboratory and were starved for 48 hours or longer before placing them on infected mice. They were not exposed to infection until a blood smear from the tail of the mouse revealed the presence of at least three or four organisms per smear. In most instances, only a small percentage of fleas exposed

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to this low degree of septicemia were found to harbor the Salmonella organisms afterwards. Best results were obtained when mouse blood smears contained five or more bacteria per microscopic field. The results from exposing various groups of fleas to infection by feeding on different mice varied from 3 to 98 percent flea infection. This was true in the case of both species of fleas used in this study, *Xenopsylla cheopis* (Roths.) and *Nosopsyllus fasciatus* (Bosc.) Upon removal from infected mice, each flea was placed in a clean test tube and stored in an incubator at 72° F. A high humidity was maintained by keeping an open pan of water in the incubator.

Method of Determining Flea Infection

As soon as fecal material was observed in the test tube after a flea had fed on an infected mouse, the flea was transferred to a clean tube. The fecal matter was emulsified with a drop of hormone broth, and then streaked with a platinum loop on Salmonella Shigella media (Difco). When the first feces culture was negative, the flea was usually discarded or fed on another infected mouse; occasionally, a second test was performed. To determine the persistence of the infection, droppings from each flea were cultured at weekly intervals until death, at which time the flea was triturated and plated.

Duration of Flea Infection

A considerable number of fleas excreted all the Salmonella organisms in their first fecal deposits following exposure to infection, while others became free of the infection at various periods as shown in the table below. *N. fasciatus* tended to harbor the infection longer than *X. cheopis*.

	X. cheopis		*N. fasciatus*	
	Number	*Percent*	*Number*	*Percent*
Free of infection after 1 positive feces	16	25.8	16	11.6
Free of infection by end of second week	12	19.4	7	5.1
Free of infection by end of fourth week	1	1.6	17	12.3
Free of infection end of eighth week	2	3.2	6	4.3
Total becoming free of infection	31	50	46	33.3
Retained infection until death or killed	31	50	92	66.6

Length of Life of Infected Fleas

S. enteritidis infection unquestionably shortened the life of *X. cheopis*. None of this species that remained infected until death survived over 40 days. Only 26 percent lived more than 30 days. The average length of life of the 31 fleas still infected at death was 24 days. Three uninfected *X. cheopis*, one male and two females carried as controls, were killed after 63 days' observation.

N. fasciatus were more resistent to the infection than *X. cheopis* as 38 percent of them survived the infection over 40 days. In fact, 18 percent lived more than 8 weeks. However, it is believed that many of the *N. fasciatus* died as the direct result of the Salmonella infection.

Symptoms of Infection

Many infected fleas of both species developed symptoms of an inflammatory condition of the gastro-intestinal tract. For instance, there were generally about twice as many fecal deposits during the last week of life as during the first week after infection. Over 20 percent of *N. fasciatus* developed a bloody diarrhea, a condition not observed among the *X. cheopis*. This diarrhea appeared as red splotches of bloody material deposited in the bottom of the test tubes with as many as four or five excretions in 24 hours. Most of the *N. fasciatus* died a few days following the appearance of diarrhea; but, in a few instances, the condition disappeared, and the fleas lived many days afterward. In one case, the flea became free of infection after excreting bloody material for 2 or 3 days.

A second noticeable feature in connection with *S. enteritidis* infection of fleas was the prolonged efforts made by many of them to feed. Numerous bites of infected fleas were frequently from 10 to 20 minutes duration. Normal fleas of both species used in this study rarely required more than 5 minutes to satisfy their appetites, although, on rare occasions, they remained attached to their hosts 10 minutes, or slightly longer. The bites of 45 percent of the Salmonella infected *X. cheopis* which survived over 2 weeks averaged 8.7 minutes per bite as compared to 2.8 minutes for the normal fleas.

The bites of infected *N. fasciatus* did not tend to be as prolonged as those of *X. cheopis*. However, the average length per feeding of 54 percent of *N. fasciatus* which survived 2 weeks or more was 6.6 minutes as compared to an average of 3.8 minutes per bite for 10 uninfected fleas of this species which were under observation for 3 to 6 weeks. Prolonged efforts to feed occurred at almost any period during the life of infected fleas, that is, during the first week after infection, or at any intermediate period during life. Not infrequently the last attempt to feed before death was unusually prolonged because of the weakened condition of the flea.

Microscopic Evidence of *S. enteritidis* Infection

At varying intervals, a large series of infected fleas were examined microscopically, and colored photomicrographs were made of many of them. The following conditions observed in these studies are believed to be the result of *S. enteritidis* infection.

Evidence of bacterial growth in the stomach. The contents of a normal flea's stomach immediately after feeding has a uniformly bright red appearance unless there is present some residue of the previous meal. This residue usually appears as a very dark substance which follows the contour of the posterior end of the stomach, or, in some instances, it may be seen as rather coarse granular material which is mixed more or less with the recently ingested blood. In the case of *S. enteritidis* infected fleas, the recently ingested meal generally has a definitely dark cloudy appearance which involves practically all of the distended stomach and which is believed to be due to the multiplication of the Salmonella organisms. Variation in the intensity of the discoloration in different zones is more characteristic of *X. cheopis* than *N. fasciatus*. In the case of the former species, the dark discoloration tended to be most intense around the periphery, next to the stomach wall, thus producing a nearly clear central zone. This condition may be due to adherence of the bacterial formations to the stomach wall, or to a tenacity of the material which prevents its diffusion throughout the ingested blood as it enters the stomach.

Stippling of the esophagus. In a number of fleas, very fine dark specks outlined nearly the entire length of the esophagus. As this condition does not occur in normal fleas, it would seem that it was produced by the Salmonella infection.

Invasion of the body cavity by the infection. In many infected fleas of both species, brownish discolored areas of varying intensity and size were observed in the posterior third of the body cavity. In some instances, these brownish formations appeared to involve the rectal pouch, or to envelop it. In normal fleas the outlines of the rectal pouch are generally visible, but in a great many of those infected with *S. enteritidis*, it was impossible to discern this structure.

Loss of tissue tone or elasticity. From the microscopic appearance of a number of fleas, it seemed that the Salmonella infection resulted in a loss of tone of the structures forming the alimentary tract. Dilatation of the esophagus by freshly ingested blood was observed in microscopic examination of several *N. fasciatus*. The blood in the esophagus of these fleas was continuous with that in the stomach through a patent proventriculus. In other instances, the esophagus was dilated after feeding, but did not contain any blood. Excessive dilatation of the stomach following feeding was observed in both *X. cheopis* and *N. fasciatus*. There were also instances in which the rectal pouch was much more distended than ever observed in normal fleas. Occasionally, fleas died in a very short time after dilatation of one or more of the alimentary structures was observed. Prolonged efforts to feed may have been due to loss of muscle tone in some cases.

Transmission by Feeding Fleas Individually on Mice

In these experiments, groups of 3 to 15 *S. enteritidis* infected fleas were fed individually on separate mice. Eight of the mice upon which these fleas were fed died of the Salmonella infection. Before mice were used in the experiments, the feces of each mouse were examined for *S. enteritidis*. A total of 58 mice was used because of the frequent shifting of each group of fleas to a fresh mouse. Whenever the feeding of infected fleas was discontinued, the mouse was set aside for observation for about a month. Then it was killed and examined for evidence of infection. The nature of the infection was proved in every mouse by macroscopic and microscopic examination, and by the cultural characteristics of the isolated Salmonella organisms. Mice were kept in sterilized individual glass jars, and the metal tubes in which they were held while fleas fed on them were sterilized before being used for another mouse

From the results of feeding individual fleas on mice, it would seem that *N. fasciatus* were more efficient vectors of *S. enteritidis* than *X. cheopis* since 138 of the former species transmitted the infection to 7 of 43 mice upon which they were fed as compared to one transmission by 46 *X. cheopis* which were fed on 15 mice.

In experiments of this type, it was impossible to determine which particular flea or bite resulted in the transmission of the infection. In some instances, the bites of two or more fleas may have been infectious. In three cases, fleas defecated from one to three times on mice that became infected. There is a possibility that these three mice might have contracted their infection by licking off the infectious feces. As none of the fleas defecated on the other five mice, it may be assumed that these mice were infected by the bites of the fleas.

The mechanism involved in the transmission of *S. enteritidis* through a flea bite is unknown. The abnormally long efforts many fleas spent in feeding suggest that the blood meal could not enter the stomach in a normal manner. This may have resulted in the regurgitation from the esophagus with the concomitant inoculation of the host. However, the microscopic examination of many fleas failed to reveal a single instance of complete blockage of the stomach such as occurs in plague-infected fleas.

Following is a short summary of four experiments which resulted in the infection of mice by *S. enteritidis* infected fleas:

Experiment 1. Between November 29 and December 4, 1948, 10 *N. fasciatus*, which were infected November 27, fed 28 times on a mouse that died December 7, 1948. During the 6 days the fleas fed on the mouse, one bite from each of six different fleas was of abnormal duration varying from 6 to 12 minutes. One flea that fed for 12

minutes on December 1, or 6 days prior to the death of the mouse, was dead when examined the next day.

Experiment 2. The mouse used in this experiment was found to be excreting *S. enteritidis* in its feces December 15. A positive blood culture was obtained from the mouse December 22, and it was dead on December 23. This mouse was exposed to the bites of three *N. fasciatus*, all of which had previously fed on the animal infected in experiment 1. Between December 10 and 13, inclusive, the fleas fed six times. The longest of these bites was one of 6 minutes duration on December 11, or 4 days before Salmonella organisms were found in the feces of the mouse. The flea responsible for this bite refused to feed the next day and was dead when examined December 13. The fleas used in this experiment were infected 14 days before they were fed on the mouse.

Experiment 3. Between January 24 and February 5, 1949, 13 *N. fasciatus* fed 80 times on a mouse that died of *S. enteritidis* infection on February 9. The fleas were infected January 14, or 10 days before they fed on the mouse. None of the flea bites could be considered abnormal. Two fleas died during the experiment, and one ceased excreting Salmonella organisms after January 31. Therefore, the record of the experiment does not provide any information regarding the time of the infectious bite or the flea or fleas responsible for the infection of the mouse. However, it is possible that the mouse may have been infected by flea feces as one flea defecated on its abdomen January 25, and a second one, on February 2.

Experiment 4. In this experiment, nine *X. cheopis*, which were infected December 29, 1948, were fed on a mouse that died February 4, 1949. The fleas were not fed on the mouse until 6 days after their infection. One positive feces had been obtained from each flea before the experiment was begun. However, the feces of four fleas were negative when tested the next time so that they had ceased to harbor Salmonella organisms before they had a chance to bite the mouse. The feces of a fifth flea was free of *S. enteritidis* after January 6, or after it had fed once on the mouse. As it is unlikely that this flea could have infected the mouse, the transmitting agent was probably one of the remaining four fleas. Two of these four fleas became free of infection during the course of the experiment—one after January 17, and the other after January 31. However, the bites of both these fleas could have been infectious prior to the dates that they ceased to excrete Salmonella organisms. Each of the four suspected fleas fed for abnormally long periods on the mouse on two or more occasions—the efforts to feed were of 10 minutes or more duration. The bite of one flea on January 7, or 28 days prior to the death of the mouse, lasted 24 minutes. The flea was dead 3 days later, having

refused to feed once in this interval. Excessively long bites were made by the other three fleas, 25, 22, 14, 11, and 8 days, respectively, before the death of the mouse. Which of these suspicious bites could have resulted in transmission of the Salmonella infection is unknown. As none of the fleas defecated on the mouse, it must have contracted the infection through the agency of one or more flea bites.

Transmission by Fleas Placed on Mice in Jars

The method most frequently employed for testing the ability of ectoparasites to transmit an infection from one animal to another is that of placing infected ectoparasites en masse on a susceptible animal in a jar or cage and then waiting for the results. Experiments of this type have certain disadvantages because it is impossible to decide whether the infection was contracted from the bites of the ectoparasites or by some other method, such as oral infection which may follow crushing the infected ectoparasite in the mouth, and possibly swallowing it; or by licking infectious feces from the body. Infected ectoparasites' feces may also contaminate the food of the test animal.

During this study, mass transmission tests were carried out by placing 206 fleas on 24 mice which were kept in separate glass jars. No more than 10 fleas were placed on any one mouse. At least two positive feces tests should be obtained before starting experiments of this type because of the large percentage of fleas that did not harbor *S. enteritidis* after the first fecal examination. Every 7 to 10 days the mice and any fleas remaining on them or in their bedding material were transferred to clean sterilized jars. At this time mouse feces were collected for cultural tests. The mice were killed, autopsied, and cultures made of their spleens, livers, and blood at the end of 5 or 6 weeks. None of the mice subjected to this routine examination showed any evidence of Salmonella infection. Before the final disposal of the mice, each mouse and the contents of the jars were searched for fleas. A total of 13 *N. fasciatus* and 9 *X. cheopis* were recovered at this time. Feces collected from these fleas and the crushed bodies were cultured. None of the fleas recovered were infected with *S. enteritidis*, indicating that all those that did not become free of the infection before the experiments ended had died.

In the *N. fasciatus* experiments 125 infected fleas were placed in lots of 5 to 10 on 13 mice. Only one mouse was infected. *S. enteritidis* was cultured from the feces of the mouse on the eleventh day, and it died on the fifteenth day. The results of these experiments did not equal those obtained by feeding *N. fasciatus* individually.

The results obtained with *X. cheopis* in the jar experiments were practically the same as those resulting from feeding individual infected fleas of this species on mice since 81 fleas infected 2 of 11 mice in jars.

One mouse upon which three infected fleas were placed died 20 days after the start of the experiment. The Salmonella organisms were not isolated from the feces of this mouse prior to its death. The feces of the other mouse were found infected 19 days after eight *X. cheopis* were placed on it. As the mouse showed signs of recovering from the infection, it was killed a week later. This was the only mouse known to have been infected through the agency of fleas that did not die from the infection.

Significance

Salmonella enteritidis is one of the agents responsible for outbreaks of acute gastroenteritis which is characteristic of the so-called food poisoning diseases. In severe cases, there is great prostration and the final outcome may be fatal. Various factors such as diseased meat and food contaminated by unsanitary conditions, including the infected feces of rats and mice, are generally considered the sources of human infection.

The experimental transmissions detailed above indicate that the two common fleas found on rats in the United States may play an important part in the dissemination of *S. enteritidis* among rodents and from them to man. Human infection could be contracted directly from the bite of the fleas, or infectious flea feces may contaminate food.

Summary

The investigation demonstrates that the two common rat fleas, *Xenopsylla cheopis* and *Nosopsyllus fasciatus* may be infected with *Salmonella enteritidis* when feeding on infected mice and that the fleas may transmit the infection from one mouse to another by their bites. Furthermore, the feces of infected fleas also contain viable organisms in large numbers and provide an additional means by which the infection may be disseminated. Many fleas become free of the infection, but over half of them remain infected until death. *S. enteritidis* infection appears to produce certain pathological conditions in the alimentary canal of fleas that tend to shorten the lives of many of them. However, some fleas survived the infection for more than 2 months. The mechanism by which the flea infects its host by its bite is unknown, but probably results from the regurgitation of infectious material from the esophagus.

NOTE.—Some experimental investigations were conducted with *Salmonella typhi-murium* (Loeffler) similar to those reported above. Fleas were found susceptible to this infection but neither of the two strains of *S. typhi-murium* employed produced as high a degree of septicemia in mice as *S. enteriditis*. No attempt was made to transmit *S. typhi-murium* with infected *N. fasciatus* by feeding fleas individually on mice, and only 12 infected *X. cheopis* were tested

in this manner. Twenty-five infected *N. fasciatus* were placed on 5 mice in jars, and 104 *X. cheopis* were similarly tested on 11 mice. No evidence of *S. typhi-murium* was found in any of the mice when autopsy examination and cultures were made a month later. These studies only proved that fleas may be infected with *S. typhi-murium*.

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Preliminary Field Trials With Laboratory-Tested Molluscacides

By M. O. Nolan and E. G. Berry*

During the past year, screening tests of chemical compounds have been conducted in this laboratory in a search for suitable agents to destroy aquatic snails that serve as intermediate hosts for the schistosomes and other trematode parasites of man. In these laboratory trials, more than 400 chemicals, mostly organic compounds, were screened. Details of the tests will be published separately.

The planorbid snail, *Australorbis glabratus*, was used as the test animal in all of the laboratory experiments. This snail is native to Puerto Rico and some of the other Caribbean islands, and is found also in Venezuela, the Guianas, and Brazil. In some of these areas, it serves as the only intermediate host and in others as the principal intermediate host of *Schistosoma mansoni*. The species is easily raised in the laboratory, and mature specimens were thus provided for all the screening tests. *A. glabratus* has not become established in the continental United States, although one species of *Tropicorbis* from Louisiana has been shown experimentally to be a potential host for *S. mansoni* (*1*). Members of the genus *Tropicorbis* are closely related both morphologically and ecologically to species of *Australorbis*. Close similarities are present in the genital structures of members of the two genera, as well as in other organs, a fact which has led Pilsbry (*2*) to suggest that *Australorbis* might be considered a subgenus of *Tropicorbis*. Both genera are found in streams, ponds, lakes, borrow pits, and roadside ditches, and representatives of each (*A. glabratus* and *T. centimetralis*) serve as natural intermediate hosts of *S. mansoni*. It was noted also that members of both genera reacted similarly to chemical compounds in the limited number of tests performed in the laboratory. A decision was therefore made to test the molluscacides on a species of *Tropicorbis* in the field.

Members of the genus *Tropicorbis* are found in Louisiana and southern Texas. A snail survey of these States had been made in 1946 by Berry (*3*) so that information concerning the species and ecology of endemic snails was available. The vicinity of Brownsville, Texas, was chosen for the preliminary field trials, since *Tropicorbis obstructus donbilli* is common in most of the fresh waters of this area.

Materials and Methods

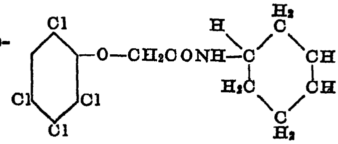
More than 80 compounds were active in varying degrees against *A. glabratus* in the laboratory. From this number, the following were selected for the preliminary field trials made in January 1949.

*From the Laboratory of Tropical Diseases, National Institutes of Health.

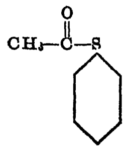
Compound and Supplier

Survey No.

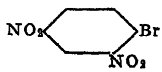
19 Acetamide, *N*-cyclohexyl-2,3,4,6-tetrachlorophenoxy- ("Tetramide A")
(Kilgore Chemicals, Inc.)



293 Acetic acid, benzenethiol ester (Chemical and Biological Coordination Center, University of Illinois)



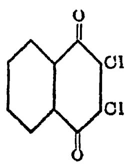
186 Benzene, 1-bromo-2,4-dinitro-
(Eastman Kodak Co.)



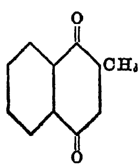
406 Guanidine, 1-dodecyl-, acetate
(American Cyanamid Co.)

$CH_3(CH_2)_{11}—NH—\overset{\overset{\displaystyle NH}{\|}}{C}—NH_2—CH_3COOH$

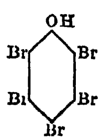
198 1,4-Naphthoquinone, 2,3-dichloro-
(U. S. Rubber Co.)



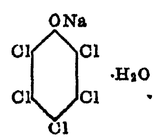
44 1,4-Naphthoquinone, 2-methyl-
(Merck & Co.)



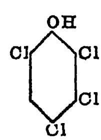
246 Phenol, pentabromo-
(Dow Chemical Co.)



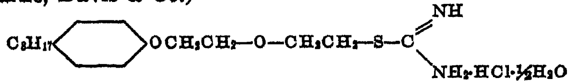
270 Phenol, pentachloro-, Na salt, monohydrate ("Dowicide G")
(Dow Chemical Co.) "85 percent active ingredients"



78 Phenol, 2,3,4,6-tetrachloro- ("Dowicide No. 6")
(Dow Chemical Co.) Glass grade



131 Pseudourea, *S*-(*β*-[*p*-*tert.*-octylphenoxy-*β*-ethoxy]ethyl)-thio-, HCl, hemihydrate
(Parke, Davis & Co.)



The areas selected for the field trials were those in which *T. obstructus donbilli* predominated over snails of other genera and species. However, in observing the toxic effect of the compounds, consideration was given also to the other species present in the area, viz, *Drepanotrema cultratum labrosum, Helisoma trivolvis,* and *Aplexa nitens*. Since the toxicity of the compounds to mammals had not been determined, it was necessary to select bodies of water in which the trials could be conducted without danger to man or domestic animals. The combination of these factors presented many difficulties, and it was impossible to find suitable small bodies of water that could be treated completely. Consequently, only measured sections of large ponds or ditches were dosed. The measured sections were staked and outlined by running heavy twine from one stake to another just above the surface of the water. The depth of the measured area was systematically determined and the mean depth computed. Volume or cubic content was then calculated. In one series of tests, all chemical compounds were dissolved in acetone, or/and alcohol (95 percent) and applied to the measured areas at the rate of one gram of chemical per 100 liters of water (10 parts per million). With all but one of the compounds, namely, pentabromophenol, there was noticeable crystallization of the chemicals on the surface of the water. Consequently, in a second series of tests, emulsions of the compounds with Tween 80 were used. These emulsions were also applied at the rate of one gram of chemical per 100 liters of water.

The calculated amounts of the compounds were dispersed, by means of "Sure-Shot" spray guns powered by compressed air, about an inch or two below the surface of the water of the measured areas. (This was a better method than the one used in the beginning of holding the gun close to the surface of the water and spraying downward.)

In order to be certain that there were sufficient numbers of *Tropicorbis* in any given area, snail populations of areas were determined before treatment with the chemicals. By use of a metal sieve fitted with a straight handle, the snails were collected from the aquatic vegetation in the water and then returned after the counts had been made. After spraying, especially with the more effective chemicals, snails could be found only in the mud on the bottom.

Local conditions for testing were much the same for all of the compounds. All but one of the compounds were tested in ponds or borrow pits, shallow marshes, and roadside ditches within a radius of 12 miles of Brownsville. The one exception was in a large shallow pond, or borrow pit, located between McAllen and Hidalgo, approximately 50 miles west of Brownsville. The aquatic vegetation was dense and numerous globular and filamentous algae were present. The compound, acetic acid, benzenethiol ester, was applied in acetone solution to a section of this pond.

An extensive drainage pond, located on the property of the Douglas Dairy Farm, approximately 7 miles south of Brownsville, was used for the testing of 7 compounds applied in acetone solutions. The area had been abandoned as a watering place for cattle and had been enclosed within a fenced area. The pond had a mud and grass bottom and was more than 370 feet long; the width varied from several to 25 feet, and the depth from 1 inch to more than 2 feet. The aquatic vegetation was variable, thicker in some spots than in others, and consisted of plants, tall grasses, cattails, duckweed (*Lemna*) and algae. There were many species of aquatic insects and insect larvae, such as water boatmen, beetles, dragonfly and mosquito larvae, as well as tadpoles and ostracods. Two species of snails, viz, *Tropicorbis obstructus donbilli* and *Drepanotrema cultratum labrosum*, were abundant in the pond, but unevenly distributed; because of this fact several hundred *Tropicorbis* from nearby areas were introduced into sections of this pond prior to chemical treatment.

Three compounds were tested in shallow marshes which were extensions of a very large resaca, located on the grounds of the Brownsville Country Club, north of town. The marshes were similar to the pond just described.

All emulsions of compounds, together with an acetone solution of pentabromophenol (2d test) were tested in roadside ditches located more than 11 miles north of Brownsville. They were shallow and filled with seepage waters, without current, with grass bottom, aquatic plants, and tall grasses. The ditches extended for several hundred yards along both sides of a main highway. Their width varied from 4 to 12 feet or more. The *Tropicorbis* in these ditches were numerous and unusually large specimens. *Drepanotrema*, *Helisoma* and *Aplexa* were less abundant. Small bivalves were present, as were frogs and tadpoles, a few salamanders, and various species of aquatic insects and larvae.

Results of the tests were checked at 24-hour intervals for a period of 3 or 4 days. With the chemicals that were especially effective, this period was extended to 5 or 6 days. In a few instances, the regular 24-hour checks had to be postponed for a day because of rainy or sleety weather. With each examination of the area after spraying, snails were collected and transferred to fresh water in beakers and observed for viability. The examinations at 24 hours and 48 hours were deliberately spotty because of unwillingness to stir up currents of water within the treated areas and thus to dilute the concentrations of the chemical. The 72-hour check was considered the most important, and at that time snails were systematically searched for in the entire treated area, and large numbers collected.

During the field tests, temperature readings of the water were taken during the day and ranged from 7° to 24° C. The average tempera-

ture during a 3-week period was 16.5° C. The pH of the water ranged from 7.2 to 7.9.

Results

The criterion of molluscacidal activity was based on the presence of live snails in the treated area at the end of a 3-day period. The circumstances and conditions under which the trials were conducted did not allow a mathematical expression of the results. There was no way of determining with accuracy the snail population prior to the treatment of the area or of recovering with certainty all snails following treatment. However, the 72-hour post-treatment check was carried out in a thorough and systematic manner and every effort was made to determine the presence of any snails which might have escaped the action of the chemical.

Results of the tests are shown in the table. Pentabromophenol and pentachlorophenol, Na salt, monohydrate ("Dowicide G") were the only compounds that proved to be good molluscacides in the field trials.

The first trials with these two compounds were in the pond on the Douglas Dairy Farm. The two sections treated with the chemicals were more than 60 feet apart. There was rather dense vegetation between the areas and no flow of water. Both compounds were lethal to a proportion of the snails (*Tropicorbis* and *Drepanotrema*) within the first 24 hours. Of the small numbers of snails collected in the area treated with pentabromophenol, at 24 hours, the majority were dead; at 48 hours, all snails collected were dead. At 72 hours, numerous snails were collected from the entire area, and all were dead. There was no collection of snails at 96 hours, but on the 5th day the area was again systematically dipped for snails. Snails were found with difficulty and, of those collected, all but 1 *Tropicorbis* were dead. In the area treated with pentachlorophenol, at 24 hours, the majority of snails collected were alive; at 48 hours, very few live snails were found; and at 72 hours, all were dead. At 96 hours, all snails collected were dead, with the exception of 2 *Drepanotrema*. With both compounds, snails outside the treated area (up to approximately 6 feet) were dead; beyond 6 feet, live snails were collected.

In the second trials, in the roadside ditches, results with pentabromophenol throughout the 72-hour examination were similar to those in the first trial. The snails in these ditches included *Tropicorbis*, *Drepanotrema*, *Helisoma*, and *Aplexa*. *Helisoma* appeared more resistant to the chemical than the other species of snails during the first 48 hours; at 72 and 96 hours, all species of snails were dead. Also, on the 6th day no live snails could be found in the area. The results with an emulsion of pentachlorophenol were not so good as

Results of field tests of potential molluscacides

Compound	Solution	Chemically treated area: Size (square feet)	Mean depth (feet)	pH of water	Temp. range of water (° C.)	*Tropicorbis* found: 24 hours	48 hours	72 hours	96 hours
Acetamide, *N*-cyclohexyl-2,3,4,6-tetrachlorophenoxy-("Tetramide A")	Acetone	143	0.6	7.9	16-22	+	+	+	------
	Emulsion	180	0.4	7.2	7-16	±	±	------	±
Acetic Acid, benzenethiol ester	Acetone	1,350	0.7	7.5	18-20	+	+	+	------
Benzene, 1-bromo-2,4-dinitro-	Acetone	220	0.8	7.8	12-16	+	+	+	------
	Emulsion	120	0.4	7.2	7-15	+	+	------	+
Guanidine, 1-dodecyl-, acetate	Alcohol	150	0.6	7.4	14-22	+	±	+	------
	Emulsion	300	0.6	7.2	12-24	±	+	+	------
1,4-Naphthoquinone, 2,3-dichloro-.	Acetone and alcohol.	60	1.1	7.8	12-22	±	±	+	------
1,4-Naphthoquinone, 2-methyl-	Acetone	150	0.6	7.4	14-22	−	+	+	------
	Acetone	40.5	0.2	7.8	12-24	−	−	+	------
	Emulsion	160	0.5	7.2	7-15	+	±	------	±
Phenol, pentabromo-	Acetone	150	1.4	7.8	12-16	∓	−	−	------
	Acetone	450	0.4	7.2	7-22	∓	−	−	−
Phenol, pentachloro-, Na salt, monohydrate ("Dowicide G").	Acetone	399	0.6	7.8	12-24	±	∓	−	−
	Emulsion	120	0.3	7.2	7-16	±	------	∓	------
Phenol, 2,3,4,6-tetrachloro- ("Dowicide No. 6").	Acetone	90	0.5	7.8	19-24	±	±	±	------
Pseudourea, *S*-(β-[*p*-*tert*.-octylphenoxy-β-ethoxy]ethyl)-thio-, HCl, hemihydrate.	Acetone and alcohol.	75	0.9	7.8	12-22	+	+	+	------
	Emulsion	180	0.6	7.2	7-16	+	------	+	------

− = dead snails.
+ = live snails.
∓ = more dead than live snails.
± = more live than dead snails.
No sign = no collection of snails.

were those with the acetone solution. Only a few live *Tropicorbis* and *Drepanotrema* were found at 72 hours, although many snails were collected. It is possible that sleety weather and low temperature conditions may have played a role in preventing the compound from exerting its lethal effect on the snails.

So far as is known, these are the first trials of pentabromophenol as a molluscacide. Sodium pentachlorophenate has been reported by McMullen, Ishii, and Mitoma (*4*) to give excellent control of the operculate snail, *Oncomelania nosophora*, in the field in Japan. Both of the compounds we employed are caustic, and, in addition, pentachlorophenol causes persons to have a choking sensation with much coughing. Insects and plants in treated areas appeared unaffected by both compounds; frogs and tadpoles were rapidly affected and died; small bivalves were found dead.

In screening tests in the laboratory, the most rapidly lethal of the 10 compounds tested in the field were 1-bromo-2,4-dinitrobenzene, 1-dodecylguanidine acetate, and the three phenols. In such tests, these compounds at concentrations of 10 parts per million and at average temperatures of 78° to 80° F. killed snails within 24 hours.

Under natural conditions in the field, 1-bromo-2,4-dinitrobenzene had no effect whatever on snails but it did kill both culicine and anopheline larvae. 1-Dodecylguanidine acetate was mostly ineffective against the snails, while 2,3,4,6-tetrachlorophenol ("Dowicide No. 6") was lethal to some. Only the last-named compound affected aquatic plants and algae.

In the field trials with *N*-cyclohexyl-2,3,4,6-tetrachlorophenoxyacetamide in acetone solution, snails were normal at all examinations; when it was used in emulsion, some dead snails were found at all examinations. The compound was lethal to tadpoles and salamanders. 2-Methyl-1,4-naphthoquinone appeared to be slightly toxic to snails. 2,3-Dichloro-1,4-naphthoquinone was mostly ineffective; benzenethiol ester of acetic acid and *S*-(β-[*p*-*tert*.-octylphenoxy-β-ethoxy]-ethyl)-thiopseudourea were ineffective.

Aplexa nitens, a large snail belonging to the family Physidae, was affected very rapidly by the more effective of the compounds. *Drepanotrema cultratum labrosum*, a small, flat planorbid snail with a tiny aperture, appeared to be the most resistant.

All the compounds were tested under rigid conditions in the field. For the most part, temperatures were surprisingly low. Brownsville and the Rio Grande Valley, along with most of southwestern United States, suffered from unusually cold weather in January. There were strong winds, rain, and, during the final trials, freezing weather. Since only measured sections of a pond or ditch were treated, there was undoubtedly some dissipation of the chemicals outside the measured areas. As stated previously, all compounds were applied at the rate of 10 parts per million based on measured areas, but it is probable that under conditions of the test, the final concentrations of the chemicals in dosed areas were less than 10 parts per million.

Summary

In preliminary field trials, the following 10 organic compounds were tested as potential molluscacides: *N*-cyclohexyl-2,3,4,6-tetrachlorophenoxyacetamide; benzenethiol ester of acetic acid; 1-bromo-2,4-dinitrobenzene; 1-dodecylguanidine acetate; 2,3-dichloro-1,4-naphthoquinone; 2-methyl-1,4-naphthoquinone; pentabromophenol; pentachlorophenol, Na salt, monohydrate ("Dowicide G"); 2,3,4,6-tetrachlorophenol ("Dowicide No. 6"), and *S*-(β-[*p*-*tert*.-octylphenoxy-β-ethoxy]ethyl)-thiopseudourea, HCl, hemihydrate.

The compounds were applied in the form of an emulsion or acetone solution in concentrations of 10 parts per million to ponds, borrow pits, shallow marshes, or roadside ditches, where the predominant snail was *Tropicorbis obstructus donbilli.* Members of this planorbid genus are closely allied both morphologically and ecologically with *Australorbis glabratus*, the principal intermediate host of *Schistosoma mansoni* in the Western Hemisphere.

Pentabromophenol and pentachlorophenol were the only compounds that showed promising molluscacidal activity. Both compounds are caustic and irritating to the mucous membrane of the respiratory tract in humans. Additional studies are needed to determine whether these chemicals can be employed with safety and whether they may be of practical value in the control of the planorbid intermediate hosts of various species of schistosomes.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 9, 1949

Summary

A total of 684 cases of poliomyelitis was reported, as compared with 479 last week (an increase of 43 percent), 510 for the corresponding week last year (representing an increase of 41 percent), and a 5-year (1944–48) median of 288. Totals for the 9 geographic divisions, all showing increases, are as follows (last week's figures in parentheses): New England 24 (13), Middle Atlantic 24 (16), East North Central 76 (39), West North Central 101 (61), South Atlantic 31 (19), East South Central 57 (29), West South Central 271 (243), Mountain 32 (21), Pacific 68 (38). States reporting the largest numbers are Texas 121 (last week 118), Oklahoma 74 (last week 51), Arkansas 70 (last week 59), California 58 (last week 29), and Minnesota 38 (last week 25). Other States reporting increases of more than 8 cases are Indiana (7 to 24), Mississippi (0 to 13, next earlier week 9), Kansas (13 to 25), Tennessee (10 to 21), Maine (0 to 10). The total reported since March 19 (average week of seasonal low incidence) is 2,957, same period last year 2,530, 5-year median 1,028.

Of 112 cases of typhoid fever (last week 74, 5-year median 101), 14 occurred in Texas, 12 in Georgia, 10 in Pennsylvania, 7 each in Virginia and Kentucky, 6 each in Ohio, Arizona and California. Only 3 other States reported more than 3 cases each.

No occurrence of anthrax or smallpox was reported.

A total of 9,359 deaths was recorded during the week in 94 large cities in the United States, as compared with 8,978 last week, 8,483 and 8,970, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,810. The total for the year to date is 256,134, as compared with 258,627 for the corresponding period last year. Infant deaths recorded during the week totaled 695, as compared with 686 last week and a 3-year median of 747. The cumulative figure is 17,548, as compared with 18,249 for the same period last year.

Telegraphic case reports from States for week ended July 9, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	------	------	------	20	------	3	10	------	4	------	------	------	5	------
New Hampshire	------	------	------	6	------	4	1	------	------	------	------	------	1	------
Vermont	------	------	------	35	------	------	------	------	3	------	------	1	1	------
Massachusetts	3	------	------	124	1	------	8	------	25	------	------	1	47	------
Rhode Island	1	------	------	5	------	4	1	------	------	------	------	------	1	------
Connecticut	------	------	------	151	------	12	4	------	5	------	------	------	12	------
MIDDLE ATLANTIC														
New York	4	------	(c)	545	2	115	16	2	d40	------	------	1	165	4
New Jersey	1	------	1	453	1	22	2	1	9	------	------	------	55	1
Pennsylvania	4	1	(c)	497	8	------	6	1	24	------	1	10	100	------
EAST NORTH CENTRAL														
Ohio	3	------	------	699	2	25	12	------	35	------	------	6	49	1
Indiana	4	2	7	73	1	4	24	1	8	------	------	2	42	10
Illinois	------	1	------	267	1	65	19	------	20	------	------	2	128	3
Michigan [a]	3	1	------	202	3	30	11	------	23	------	------	------	29	------
Wisconsin	------	------	------	765	1	------	10	------	12	------	------	------	49	------
WEST NORTH CENTRAL														
Minnesota	------	1	------	20	1	11	38	------	4	------	------	------	2	------
Iowa	1	------	------	32	2	------	8	------	6	------	------	------	6	1
Missouri	------	------	------	4	1	2	17	------	3	------	------	3	4	------
North Dakota	------	------	------	4	------	------	5	------	2	------	------	------	------	------
South Dakota	------	------	------	6	1	------	2	------	------	------	------	------	------	------
Nebraska	------	------	5	19	1	------	0	------	14	------	------	5	------	------
Kansas	1	------	2	48	------	6	25	------	6	------	1	2	6	------
SOUTH ATLANTIC														
Delaware	1	------	------	4	------	------	------	------	------	------	------	------	1	------
Maryland [a]	3	------	2	47	------	19	------	1	d6	------	------	------	14	------
District of Columbia	------	------	------	11	1	13	------	------	5	------	------	------	------	------
Virginia	5	------	46	166	2	36	4	3	6	------	2	7	22	2
West Virginia	------	------	6	9	3	------	4	------	3	------	------	2	19	------
North Carolina	------	------	------	105	1	------	5	3	8	------	------	3	38	------
South Carolina	6	------	88	98	1	37	5	------	------	------	------	------	11	2
Georgia	1	------	3	23	1	14	7	1	2	------	1	12	3	8
Florida	1	------	3	50	------	15	6	------	1	------	2	2	1	------

Telegraphic case reports from States for week ended July 9, 1949—Continued

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
EAST SOUTH CENTRAL														
Kentucky				57		8	13		3			7	8	9
Tennessee	3		2	48	2	24	21	3	4			3	40	
Alabama	5			37	1	9	10		9			2	28	10
Mississippi [a]	5		1	11	2	15	13		7		1	2	13	
WEST SOUTH CENTRAL														
Arkansas	2		49	25	1	15	70		1		4	3	35	
Louisiana	2		1	10		24	6		2			4		1
Oklahoma		2	3	96		29	74	1	5		1	4	6	4
Texas	6	1	267	164	8	200	121		16			14	168	17
MOUNTAIN														
Montana				41					2					
Idaho	1		5	37		2	14		d 4				7	
Wyoming				2							3	1		
Colorado	1		12	95	1	13	10		4		2	1	14	3
New Mexico	1			13		6	5	1	2				3	
Arizona	1		13	38		6	2	1	1			6	8	1
Utah [a]				34			1	1	2		1		30	
Nevada														
PACIFIC														
Washington			3	78	1		5		5				19	
Oregon		1	5	211	1	35	5		3				33	
California	11		3	257	2	25	58		d 25			6	72	
Total	80	10	527	5,742	54	848	684	20	369		19	112	1,295	
Median, 1944–48	138	8	526	4,299	65		288	20	823	2	18	101	2,172	
Year to date 27 weeks	3,768	279	74,712	574,613	2,046	50,951	3,881	258	56,970	40	659	1,405	28,766	
Median, 1944–48	6,297	239	188,732	526,914	4,029		1,425	193	82,937	248,	503	1,687	51,223	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept 4	(37th) Sept. 18		(11th) Mar. 19		(32nd) Aug. 14	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	8,882		110,982	627,006	2,890		2,957		79,668	50		945	38,799	
Median, 1943–48 [b]	13,863		332,841	561,860	5,533		1,028		121,508	331		1,212	82,489	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for poliomyelitis and typhoid fever the corresponding periods are 1944–45 to 1948–49, inclusive.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately, as follows: Ohio 1, West Virginia 1, Georgia 2, Florida 1, Kentucky 1, Tennessee 1, Oklahoma 1, Texas 2, Arizona 4, California 1. Cases reported as Salmonella infection, not included in the table, were as follows: New York 4, Massachusetts 2.

Alaska: Influenza 1, pneumonia 4, streptococcal throat 11.
Hawaii Territory: Influenza 2, measles 8, lobar pneumonia 1, typhoid fever 1.

PLAGUE INFECTION IN BEAVERHEAD COUNTY, MONT.

Under date of July 8, plague infection was reported proved in specimens of tissue and ectoparasites from ground squirrels collected in Beaverhead County, Mont., on a ranch 24 miles northwest of Dillon on the Jackson road, as follows:

In a pool of 31 lice from 28 ground squirrels, *Citellus columbianus*, shot June 22 (a pool of 30 fleas from the same animals failed to be proved infectious); in pools of 75 fleas and 21 lice, inoculated separately, from 53 ground squirrels, *Citellus richardsonii elegans*, shot June 23, and in 2 specimens of tissue, inoculated separately, from 2 of the same 53 ground squirrels; and in pools of 62 fleas and 55 lice, inoculated separately, from 44 ground squirrels, *C. richardsonii elegans*, shot June 24.

DEATHS DURING WEEK ENDED JULY 2, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended July 2, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,978	8,963
Median for 3 prior years	8,079	
Total deaths, first 26 weeks of year	246,775	250,144
Deaths under 1 year of age	686	646
Median for 3 prior years	630	
Deaths under 1 year of age, first 26 weeks of year	16,853	17,637
Data from industrial insurance companies:		
Policies in force	70,356,854	71,015,454
Number of death claims	12,139	11,615
Death claims per 1,000 policies in force, annual rate	9.0	8.6
Death claims per 1,000 policies, first 26 weeks of year, annual rate	9.5	9.9

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—May 1949.—During the month of May 1949, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	14		2		10		7		33	
Diphtheria	5	2		1					5	3
Dysentery:										
Amebic							1		1	
Bacillary	1				1				2	
German measles					2				2	
Hepatitis, infectious	2				1		2		5	
Leprosy				1						1
Malaria [2]	2				11		94	2	107	2
Measles			2		6		1		9	
Meningitis, meningococcal							1		1	
Mumps							1		1	
Pneumonia		7		1	13			4	[3] 13	12
Poliomyelitis	1				1				2	
Relapsing fever							1		1	
Scarlet fever	1								1	
Tetanus	1						1		2	
Tuberculosis		11		1	1	2		7	[3] 1	21
Typhoid fever			1				1		2	
Typhus fever (endemic)	2								2	
Yaws	1								1	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 3 recurrent cases.
[3] Reported in the Canal Zone only.

Puerto Rico

Notifiable diseases—4 weeks ended June 25, 1949.—During the 4 weeks ended June 25, 1949, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	51	Tetanus	21
Diphtheria	21	Tetanus, infantile	4
Gonorrhea	122	Tuberculosis (all forms)	569
Influenza	100	Typhoid fever	12
Malaria	23	Typhus fever (murine)	10
Measles	18	Whooping cough	195
Syphilis	58		

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended June 18, 1949.—During the week ended June 18, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		35	3	168	430	40	109	62	134	981
Diphtheria				2						2
German measles		15		163	63	13	44	82	28	408
Influenza		19			2	4				25
Measles		61	17	274	380	277	198	341	410	1,958
Meningitis, meningococcal				1				1		2
Mumps		49	1	38	217	31	2	20	127	485
Poliomyelitis				7	2		1		1	11
Scarlet fever		1	2	62	45	2		10	16	138
Tuberculosis		3	22	101	20	33	19		58	256
Typhoid and paratyphoid fever				4						4
Undulant fever				2	5					7
Venereal diseases:										
Gonorrhea		8	12	77	76	24	21	32	72	322
Syphilis		9	5	46	44	8	2	2	19	135
Whooping cought		13		46	41	3	1		3	107

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January–April 1949	May 1949	June 1949—week ended— 4	11	18	25
ASIA						
Burma	62	116	16	1	5	
Bassein	14	114	15		5	
Moulmein		2				
Rangoon			1	1		
Ceylon		1	1			
India	38,962	8,138	1,297	[1] 793	[1] 242	[2] 109
Allahabad	4	1				
Bombay	[3] 1		[3] 1	[3] 1		
Calcutta	[4] 3,244	[4] 725	[4] 49	[4] 59	[4] 57	[4] 56
Cawnpore	26	19	17	9	16	16
Cuddalore	2					
Lucknow	9	11	2	3		
Madras	24	33	5	4	4	6
Masulipatam			1			
Negapatam	25	1				
New Delhi					[3] 1	1
Raj Samand		10				30
Tuticorin	14					

CHOLERA—Continued

Place	January–April 1949	May 1949	June 1949—week ended—			
			4	11	18	25
ASIA—continued						
India (French):						
Karikal	55					
Pondicherry	100					
Indochina (French):						
Annam	53					
Cambodia	32	2	2		4	2
Cochinchina	3	1	1	3	1	
Pakistan	16,751	[5] 2,251	[2] 3	[2] 7		
Chittagong	54	9	[2] 1	7		
Dacca	69	21	2			
Lahore	5	6				
Siam		8		1		
Bangkok		8				

[1] Preliminary figures. [2] In ports only. [3] Imported. [4] Includes imported cases. [5] May 1–14, 1949

PLAGUE

(Cases)

AFRICA						
Basutoland	12					
Belgian Congo	6				1	
Costermansville Province					1	
Stanleyville Province	6					
British East Africa:						
Kenya	1	1				
Tanganyika	15					
Madagascar	60	4				
Tananarive	3					
Rhodesia, Northern	2					
Union of South Africa	33			1	1	1
ASIA						
Burma	[1] 386	10				1
Mandalay	1					
Moulmein	[1] 4	5				
Rangoon	[1] 4	[2] 1				1
China:						
Chekiang Province	7					
Wenchow	7					
Fukien Province	20					
Kiangsi Province	9					
India	23,679	[3] 425	[3] 76	[3] 51	[3] 32	
Indochina (French)	63	[4] 11	1	1	1	
Annam	7	[4] 10			1	
Cambodia	20					
Cochinchina	28	1	1	1		
Laos	3					
Java	5					
Siam	148	3		1		
EUROPE						
Portugal: Azores	3	1				
SOUTH AMERICA						
Brazil [5]						
Peru:						
Lambayeque Department	7					
Lima Department	3					
Piura Department	6					
Venezuela:						
Aragua State	1					
OCEANIA						
Hawaii Territory: Plague infected rats [6]						

[1] Includes imported cases. [2] Imported. [3] Preliminary figures. [4] Includes cases of pneumonic plague. [5] Delayed reports show a total of 391 cases of plague with 54 deaths in Brazil in 1948. The figures published in Public Health Reports for April 29, 1949, p. 546, include reports only through August 1948. [6] Plague infection has been reported in Hawaii Territory as follows: On Mar. 12, 1949, in a mass inoculation of 2 pools of tissue from 10 rats (8 and 2), taken on Maui Island; on Mar. 16, 1949, in mass inoculation of 3 pools of 29 fleas (7, 12, and 10) from rats trapped on the Island of Hawaii.

SMALLPOX

(Cases)

(P=present)

Place	January-April 1949	May 1949	June 1949—week ended—			
			4	11	18	25
AFRICA						
Algeria	98	14				
Angola	[1] 239					
Belgian Congo	[1] 742	199	1	47		
British East Africa:						
Kenya	15	6	1	1		
Nyasaland	688	84	34	25		
Tanganyika	122					
Uganda	32					
Cameroon (British)	9					
Cameroon (French)	30	22	[2] 1			
Dahomey	185	43	[2] 7		[3] 10	
Egypt	3					
Ethiopia	4					
French Equatorial Africa	6	15				
French Guinea	1					
French West Africa: Haute Volta	57	5	[3] 16		[3] 17	
Gambia	40	9				
Ivory Coast	169	25	[3] 13		[3] 2	
Morocco	8					
Mozambique	83	28	8			
Nigeria	4,712	768	[4] 5	[4] 14	[4] 15	
Niger Territory	252	145	[2] 4			
Portuguese Guinea	1					
Rhodesia:						
Northern	4		1			
Southern	182					
Senegal	15	1				
Sierra Leone	98	1				
Sudan (Angelo-Egyptian)	29	38	14	8	18	
Sudan (French)	151					
Togo (French)	57	7	[2] 8		[3] 18	
Union of South Africa	124	P	P	P	P	P
ASIA						
Afghanistan	24					
Arabia	[5] 34					[6] 3
Bahrein Islands	44	1	1			
Burma	1,209	[7] 48	[7] 6	[7] 6	[7] 1	[7] 2
Ceylon						[6] 1
China	800	36	[2] 3		4	4
India	39,535	6,884	[8] 1,074	[8] 539	[8] 339	
India (French)	1					
India (Portuguese)	175	5	4			
Indochina (French)	2,116	82	8	9	9	11
Iran	175	7	2			
Iraq	263	47	2	34	11	3
Israel	2					
Japan	39	54	9	8		
Korea	544					
Lebanon	121	[5] 12	3	2		
Malay States (Federated)	43					
Netherlands Indies:						
Java	[5] 3,170	968	276	247	265	251
Riouw Archipelago		2				
Sumatra	[5] 49	19	6	9	2	9
Pakistan	2,547	[9] 216				
Philippine Islands:						
Mindoro Island	11					
Romblon Province	[6] 4					
Portuguese Timor	4					
Siam	37					
Straits Settlements: Singapore	[5] 2					
Syria	262	58	3	20	8	3
Transjordan	142	23	8	6	5	2
Turkey. (See Turkey in Europe)						
EUROPE						
Belgium					1	
Great Britain: England and Wales	[5] 16	4				
Italy	2	[10] 90		[11] 5		
Portugal: Lisbon	3					
Spain	1	1				
Canary Islands		6				
Turkey	87	1			1	

SMALLPOX—Continued

Place	January–April 1949	May 1949	June 1949—week ended—			
			4	11	18	25
NORTH AMERICA						
Cuba: Habana	[5] 4	[6] 1	1			
Guatemala	1					
Mexico	14	[9] 12		[12] 9	1	
SOUTH AMERICA						
Argentina	[1] 54	[13] 25				
Bolivia	35					
Brazil	[1] 64	5	1		3	
Chile		[6] 2				
Colombia	[1] 1,024	[1] 290				
Ecuador	[1] 407	[1] 43				
Paraguay	[14] 1	[14] 1				
Peru	685					
Venezuela	[1] 531	[1] 33	[14] 1		[14] 2	

[1] Includes alastrim. [2] June 1–10, 1949. [3] June 11–20, 1949. [4] In Lagos only. [5] Includes imported cases. [6] Imported. [7] In ports only. [8] Preliminary figures. [9] May 1–14, 1949. [10] In Rome, January 1–May 27, 1949 (varioloid). [11] In Rome May 28–June 10, 1949 (varioloid). [12] May 15–June 11, 1949. [13] April 1–May 31, 1949. [14] Alastrim.

TYPHUS FEVER *

(Cases)

(P=present)

Place	January–April 1949	May 1949	June 4	June 11	June 18	June 25
AFRICA						
Algeria	39	4				
Basutoland	5					
Belgian Congo	[1] 41					
British East Africa:						
Kenya	1					
Nyasaland			4			
Egypt	152	18		2		
Eritrea	35	5	2	2	3	
Ethiopia	208	45				
Libya	98	35				
Madagascar: Tananarive	[1] 5					
Morocco	10	1	[3] 1		[3] 1	
Sierra Leone		[1] 1				
Tunisia	53	2				
Union of South Africa	[4] 42	P	P	P	P	P
ASIA						
Afghanistan	1,269					
Arabia: Aden	[5] 2					
Ceylon: Colombo	[1] 2	[1] 1		[1] 1		
China	22	1				
India	[1] 112	[6] 1		1		
India (Portuguese)	8	2				
Indochina (French)	3	3	2	1	1	
Iran	111	4				
Iraq	[4] 21	[4] 5	1	1	1	
Japan	75	7	3	1		
Korea	142					
Lebanon	[1] 1					
Pakistan	500	62	3	17	5	2
Palestine	100					
Philippine Islands: Manila	1					
Straits Settlements: Singapore	[4] 2					
Syria	2	13	4	1		
Transjordan	42	8	3		2	
Turkey. (See Turkey in Europe.)						
EUROPE						
Belgium	1				4	
Bulgaria	165	85	10	15		
Czechoslovakia	8	9	1	1	1	
France	2					
Great Britain: Island of Malta	[1] 3					
Greece	22	4	1		2	2
Hungary	15	2		1	2	
Italy	27		[1] 2			
Sicily	13					
Poland	179	1				
Portugal: Lisbon	4					
Rumania	382	35				

See footnotes at end of table

TYPHUS FEVER—Continued

Place	January-April 1949	May 1949	June 1949—week ended—			
			4	11	18	25
EUROPE—continued						
Spain	1	1				
Turkey	91	18	3	5	3	2
Yugoslavia	103	27				
NORTH AMERICA						
Costa Rica [1]	13	2		13		
Cuba [1]	2	1				
Guatemala	11					
Jamaica [1]	6					
Mexico [4]	61	8		2	3	
Panama Canal Zone	3	2				
Puerto Rico	7	3	2	2	2	4
Salvador, El [7]						
SOUTH AMERICA						
Argentina [1]	1					
Bolivia [7]	53					
Brazil	2					
Chile [7]	74	32	9	5		
Colombia	970	208				
Curacao [1]	4			1		
Ecuador [4]	107	15	2	3		
Peru [7]	7					
Venezuela [1]	15	4	1			
OCEANIA						
Australia [1]	50	16	5	1		
Hawaii Territory [1]	3				2	

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Murine type. [2] June 1–10, 1949. [3] June 11–20, 1949. [4] Includes murine type. [5] Includes imported cases. [6] Imported. [7] Delayed reports. Additional reports of cases of typhus fever received since publication of figures for the year 1948 in Public Health Reports for April 29, 1949, p. 549, show the following totals for that year for the countries listed as follows; El Salvador 2 cases (1 fatal); Bolivia 159 cases; Chile 817 cases; Peru, 1,863 cases; Venezuela 200 cases.

YELLOW FEVER

(C=cases; D=deaths)

Place		January-April 1949	May 1949	June 4	June 11	June 18	June 25
AFRICA							
Belgian Congo:							
Stanleyville Province	D	5					
Gold Coast	C	1	2	1			
Birim District	C	[1] 1	[1] 1				
Komenda Village [2]	D		1				
Oseikrome Village [2]	D			1			
Nigeria:							
Lagos	D	[3] 2					
NORTH AMERICA							
Panama:							
Pacora	C	[4] 8					
SOUTH AMERICA							
Brazil:							
Amazonas State	D	1					
Para State	D	2					

[1] Suspected. [2] Near seaport of Sekondi. [3] Cases admitted to Lagos Hospital from ship that arrived from two other ports in Nigeria—Warri and Burutu. [4] Reported January 15, 1949. Date of occurrence November 11–December 30, 1948. Five cases, all fatal, confirmed; 3 suspected cases.

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, U. S Government Printing Office, Washington 25, D. C.
Price 10 cents, Subscription price $4 00 a year

Public Health Reports

VOLUME 64 AUGUST 5, 1949 NUMBER 31

TUBERCULOSIS CONTROL ISSUE NO. 42

IN THIS ISSUE

What is a Reportable Case?
Temperature Control of Processing Solutions
Nursing Care for the Tuberculous
X-ray Films, Screens, and Developers, VIII

FEDERAL SECURITY AGENCY

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CONTENTS

	Page
What is a reportable case of tuberculosis? Cedric Northrop, Robt. J. Anderson, and Herbert I. Sauer	961
Simple apparatus for controlling temperatures of film-processing solutions. Willard W. Van Allen	968
Effective nursing care for the tuberculous. Chesley Bush, Esta H. McNett, Lucile Petry, and Martha B. Naylor	971
Characteristics of commercial X-ray screens and films, VIII. Willard W. Van Allen	979
Map—Tuberculosis (all forms) death rates per 100,000 population—United States, 1947	981
Map—Number of deaths and cases, tuberculosis (all forms) United States, 1947	982
Map—Tuberculosis proportionate mortality—United States, 1947	983
Map—Number of rural and urban public health nurses, January 1, 1948	984
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended July 16, 1949	985
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended June 25, 1949	988
Norway—Notifiable diseases—March 1949	988
Jamaica—Notifiable diseases—4 weeks ended June 25, 1949	989
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Cholera	989
Plague	989
Smallpox	989
Typhus fever	990
Yellow fever	990
Deaths during week ended July 9, 1949	990

Public Health Reports

Vol. 64 • AUGUST 5, 1949 • *No. 31*

What Is A Reportable Case of Tuberculosis?

By Cedric Northrop, M.D., Robt. J. Anderson, M.D., and Herbert I. Sauer, B.A.[*]

In one large American city, the reporting of cases of tuberculosis has been compulsory for more than half a century. Yet, despite this long history of experience in the field, about 40 percent of the tuberculosis deaths in the past 6 years were never reported as living cases of tuberculosis. And this is not alone the experience of this particular city. The American Public Health Association (*1*) reported in 1947 that in 66 communities 30 to 89 percent of the tuberculosis deaths were unreported as living cases.

The current status of tuberculosis morbidity reporting in the United States is confused, shows uneven development from area to area, and, generally, leaves much to be desired. The usual experience of mass chest X-ray surveys, in which the majority of cases of tuberculosis are previously unknown to the health department concerned, is demonstrable proof of this.

At the present time, general agreement can be reached on only one point: that there is an abundance of disagreement—disagreement on objectives, on definitions, and on procedures. One of the greatest blocks to good reporting, for example, still remains the lack of any clear-cut definition of what may be considered a reportable case of tuberculosis; this, despite more than 30 years of almost universal compulsory reporting in the United States (*2*). Confusion still remains, too, on such basic questions as: Who should report? How should cases be reported? What reports should be counted? What types of medical diagnoses should be reported, and which of those reported should be counted?

*Head of Tuberculosis Control Section of Washington State Department of Health; medical director, and health program representative, Division of Tuberculosis, Public Health Service, respectively.

This is the forty-second of a series of special issues of Public Health Reports devoted exclusively to tuberculosis control, which will appear in the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the Public Health Reports. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

Why Reporting?

Tuberculosis case reporting has many purposes. In general, these may be summarized as follows:

1. Individual case supervision:

   (*a*) In order to accomplish continuous supervision and treatment as long as may be necessary to prevent further spread of the disease; and

   (*b*) In order to obtain needed information about individual tuberculous patients.

2. Program management:

   (*a*) For epidemiological information;

   (*b*) In order to determine the extent and nature of the tuberculosis control problem; and

   (*c*) In order to provide a means of evaluating the effectiveness of control measures.

To achieve these objectives, good initial reporting, as well as efficient follow-up, is essential. At the local and district levels, the instrument for directing follow-up and case supervision will ordinarily be a tuberculosis case register; at the State level, it may be either a case-record system or merely a master index of reported tuberculosis cases. None of these devices, however, can serve their intended purposes without accurate and complete case reporting.

Nor can there be effective program management in terms of intelligent planning and evaluation until case reporting has reached a degree of completeness and accuracy. As a preliminary step, the study of morbidity reports may be used to good advantage to measure the effectiveness of reporting itself. The ratio of newly reported cases per tuberculosis death, which has been in use for many years, can be a useful tool in the measurement of the completeness of reporting.

Obviously, where reporting is inadequate, it cannot serve as the basis for program management. Under such circumstances, morbidity reporting can be used only for the purpose of demonstrating that reporting is poor and that prompt and full reporting of cases upon diagnosis needs to be encouraged. A case in point here is that of the State health department whose office of morbidity statistics received and counted two new tuberculosis morbidity reports from a particular county in a recent year. During that same year, however, the Division of Tuberculosis of that same health department received informal reports on 124 new cases. Although other instances of the failure of reporting systems may be less spectacular, they nevertheless appear frequently.

Once reporting is established on a sound basis, the way is opened for the kind of evaluation and planning which will give direction and meaning to control efforts. To begin with, case reporting provides a reliable means for evaluating the effectiveness of case-finding efforts.

And having established both case reporting and case finding on an adequate and stable basis, morbidity information then becomes an invaluable tool, permitting the study of specific problems relating to the disease and its control, and facilitating the measurement of the size and nature of the problem, as well as of control trends. Heretofore, such measurements have been largely presumptive, based usually on tuberculosis death rates.

Who Reports?

State laws and health department regulations frequently specify that any person who knows or suspects an individual to be tuberculous is required to report this fact. In practice, however, only physicians' diagnoses are accepted and counted. All physicians, whether they be consulting specialists, general practitioners, or employed by tuberculosis control agencies, are required to report all cases of tuberculosis known to them. Clinics, hospitals, sanatoria, and laboratories are also used to facilitate more complete reporting. Several States are willing to accept positive sputum reports from laboratories as case reports. On the other hand, many States, particularly those in which acid-fast saprophytes are frequently found, prefer not to accept such reports as diagnoses of tuberculosis until verified clinically.

How Are Tuberculosis Cases Reported?

The specific form to be used in reporting cases of tuberculosis has been the subject of widespread discussion for many years. Simplicity and convenience are, of course, primary considerations in the selection or design of such a form in order to assure the widest possible participation by physicians and others responsible for reporting. In one State, two separate forms are currently in use, and selection of the particular form to be used is left to the convenience of the person or agency reporting. Thus, a special tuberculosis morbidity report form is used primarily by chest specialists, both in clinics and in private practice, and by any other physicians who see substantial numbers of tuberculosis cases. General practitioners, on the other hand, are encouraged to report cases of tuberculosis on the general morbidity report form, although they may, if they choose, use the special reporting form.

The use of special forms has several advantages over that of the general morbidity form insofar as the reporting of tuberculosis is concerned. On the one hand, it is obviously more convenient when used by chest specialists and others who see tuberculosis frequently. On the other, these special forms permit a director of tuberculosis control to obtain at least a minimum of information about stage of

disease, activity, sputum status, and conditions of supervision—all basic to the intelligent direction of a control program.

Desirable as the special form is from the administrative point of view, it may sometimes be difficult to require its use by any but those having frequent contact with tuberculous patients. The general practitioner, who normally sees few such cases, and who normally uses the general morbidity reporting form (which calls only for name, address, age, sex, race, and identification of disease) might, perhaps, find it difficult to keep on hand and use supplies of specialized reporting forms.

Where the general reporting form is used, auxiliary procedures may need to be established in order to obtain detailed information. One State uses this approach by employing the general morbidity reporting form, and, upon receipt of such a report on a case of tuberculosis, having the local health department query the reporting physician by telephone for sufficient additional information to complete a special tuberculosis morbidity report.

In general, almost half the States use a special tuberculosis morbidity report form, while the remaining States use the general morbidity report form for the reporting of tuberculosis. Some States, in an effort to obtain reports on all known cases at the earliest possible moment, accept letters, sanatorium admission or discharge reports, and Veterans Administration and other reports containing diagnoses of tuberculosis signed by physicians. In a study of 19 States, 11 were found to accept reports from informal sources of this type. However, a special study by the Division of Public Health Methods, Public Health Service (*3*) demonstrates that these basic sources of reporting are often not incorporated into the reporting system. Other observations also indicate that reporting is often incomplete from sanatoria, hospitals, and, for that matter, health department clinics. In other words, a health department may, in some instances, forget or neglect to report a case even to itself.

In an effort to have the most complete reporting, too, most of the 19 States in the first study mentioned above accept as morbidity reports death certificates which cite tuberculosis as the cause of death, if no previous morbidity reports have been filed on such cases. We are informed, however, that at least two States do not follow this procedure.

How Are Reports Counted?

In general, a tuberculosis case report is cleared with the health department master index of reported tuberculosis cases. If a previous report is found, it is not counted as a new case; if no previous report is found, it is counted as a newly reported tuberculosis case.

In the past 6 years substantial progress has been made in the improvement of reporting procedures. All States now have a master index of reported tuberculosis cases, but they are not all functioning with equal effectiveness. At least five of these State indexes are definitely inadequate—in one State because private physicians are not required to report patients by name; in three States because the largest city does not report the names of its cases to the State; and in another State because the file is arranged by counties. In yet another State, reporting falls short of the mark because of the practice, over many years, of destroying cards for cases which have moved out of the State or which have been reported definitely inactive. Thus, if a patient returns to the State or his disease becomes reactivated, and he is again reported, he is counted a second time as a new tuberculosis case. These and other procedures make it either impractical or impossible to eliminate duplication, so that accuracy is limited.

In some States, too, cards on suspects have been interfiled with those on cases, without any entry as to which are cases and which are suspects. Thus, when a case is found to have been previously placed in the file, it cannot be counted as a new case, even though the previous report may have been merely a suspect report. The same problem is encountered in those States which have in years past filed pulmonary calcifications with active tuberculosis. Futhermore, in those States where death certificates, sanatorium reports and other reports of tuberculosis cases are not counted unless the case is also reported on the official form, the count of known cases is also obviously incomplete.

Other types of administrative procedure serve to complicate reporting practices further in some areas. One State, for example, requires the physician to report each case twice, after which the State health officer reviews the case to decide whether it is to be counted as a case of tuberculosis. In one large city, a tuberculosis case is not counted until a nurse visits the patient's home. In other words, even though the leading chest specialists in the city and the director of tuberculosis control all agree upon the diagnosis of clinical tuberculosis, it is not recognized and counted as a case of tuberculosis as far as the official morbidity statistics are concerned if the patient moves before the nurse's visit or if the nurse is unable to find anyone at home. On the other hand, if a case is classified as "minimal inactive tuberculosis, dismiss," it is nevertheless counted if the nurse talks with a member of the patient's family.

Any count of the number of newly reported tuberculosis cases in a city or State is ordinarily assumed to be the number new to that geographic area. Some of those cases may have been diagnosed elsewhere, but the health department concerned will frequently have no

opportunity of determining whether they were actually reported elsewhere. In a study of 19 States, it was found that 15 accept Interstate Reciprocal Notification of Disease Reports and similar forms as sources of reporting, even though the cases have already been diagnosed in another State, while several States count such reports only after an official morbidity report is received. At least one local and one State health department exclude such cases from their counts of newly reported tuberculosis cases entirely.

What Medical Diagnoses Are Counted?

The fundamental question which governs policies determining the acceptance of tuberculosis morbidity reports is: *What is a Reportable Case?* Because there is basic and widespread disagreement over this point and over such matters as what, medically, constitutes a case of tuberculosis, and what types of medical diagnoses to accept, practices vary widely from State to State, and for that matter, may vary from county to county within a given State.

Information obtained on the practices in 19 States shows that 15 of them count both active and inactive tuberculosis cases, 2 report only active cases, and 2 do not have any definite policy. Another health department has the policy of counting reports on inactive cases; in practice, however, no inactive cases are reported except those found in mass X-ray work. Some health departments count as a case of tuberculosis an individual classified as "Minimal, inactive, dismiss, not significant for further follow-up." Three States have the policy of reporting (*a*) all reinfection pulmonary cases except those "apparently cured"; (*b*) active primary tuberculosis; (*c*) active nonpulmonary tuberculosis; and (*d*) acute pleural effusion which is either definitely or presumably tuberculous. It seems probable that a number of other States follow a close approximation of this policy which was approved by the American Trudeau Society (*4*) in 1944.

In a number of States the regulations require that suspected cases be reported as well as diagnosed cases. In practice, however, it is the usual procedure to count only those definitely classified as tuberculous.

Many States do not require the reporting of primary tuberculosis, and, generally, reports on such cases are not counted when received. However, one State just recently inaugurated the practice of counting primary tuberculosis.

While active nonpulmonary tuberculosis is generally considered reportable, one State's general morbidity report specifies merely "Tuberculosis, pulmonary" as one of the reportable diseases.

In the extensive mass case-finding programs in operation in many parts of the country, many cases are being found with X-ray shadows

typical of pulmonary tuberculosis and with varying degrees of clinical and laboratory evidence to establish definite diagnoses. Frequently, more cases of probably inactive tuberculosis are found than of active tuberculosis. Agreement should be reached on what types of cases should be reported and counted in order to make morbidity statistics satisfactory for comparison purposes, either from one State to another or from one year to another.

The primary need is for working definitions which may be applied at once, and which will, if possible, be stated in such a way as to permit amplification and greater precision as research on clinical, X-ray, and laboratory diagnostic techniques progresses. In general, the term, "suspected tuberculosis" has been used extensively, as well as three categories of diagnosed tuberculosis—active, undetermined, and inactive.

It is felt by many that the Diagnostic Standards, now being revised by the American Trudeau Society and the National Tuberculosis Association, should be utilized in the study of this problem as should the Sixth Decennial Revision of the International Lists of Diseases and Causes of Death. The most significant codes in this latter classification are:

006—Radiological evidence suggestive of active respiratory tuberculosis not classifiable elsewhere. (This has been interpreted to include all those cases which are to be followed because of the possibility that they may have active tuberculosis.)

001, 002, 003—Pulmonary and pleural tuberculosis (excluding cases with no evidence of clinical tuberculosis and which require no present treatment or supervision.)

Special condition in examination without sickness:

Y03—Follow-up examination for inactive tuberculosis, not needing further medical care.

The Detroit Conference

On May 2, the entire problem of tuberculosis morbidity reporting in the United States was reviewed and discussed by the Annual Joint Meeting of State Tuberculosis Control Officers and State Sanatoria and Hospital Directors, which was held in Detroit.

The Conference agreed that there is an urgent need for improved reporting procedures in order to achieve the acknowledged objectives of tuberculosis morbidity reporting. It is of major significance that the Conference recommended the appointment of a committee to study the problem fully and to present a proposed program for the improvement of reporting at the next joint annual meeting. The Conference further suggested that the special committee give consideration to the following:

1. The problem of defining a reportable case of tuberculosis in the light of the Revised International List of Causes of Death and of the pending revision of the American Trudeau Society's Diagnostic Standards.

2. The problem of reporting and counting inactive tuberculosis.

3. The possibility of obtaining greater similarity in forms and—more important—in procedures throughout the country.

The Conference's recommendation should come as welcome news to all participants in the work of tuberculosis control. The committee's work will be difficult, to be sure, but results of its studies may be expected to make important contributions toward more effective control. The authors can only offer their best wishes for the committee's success in resolving the many problems of tuberculosis morbidity reporting.

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Simple Apparatus for Controlling Temperatures of Film-Processing Solutions

By Willard W. Van Allen, B.Sc.*

Sensitometric work in the processing of films requires the precise control of the temperatures of all solutions used. To accomplish this, the Electronics Laboratory of the Division of Tuberculosis has for some time employed a system which is simple, inexpensive, and accurate. Although this temperature control system is neither novel nor original, visitors to the Laboratory have shown so much interest in it that a full description appears appropriate.

As may be seen from the schematic diagram, the system requires the following components: a conventional water jacket; insert tanks for processing solutions; a mercury-column thermostat and suitable relays; a circulating pump, and a source of small quantities of hot and cold running water.

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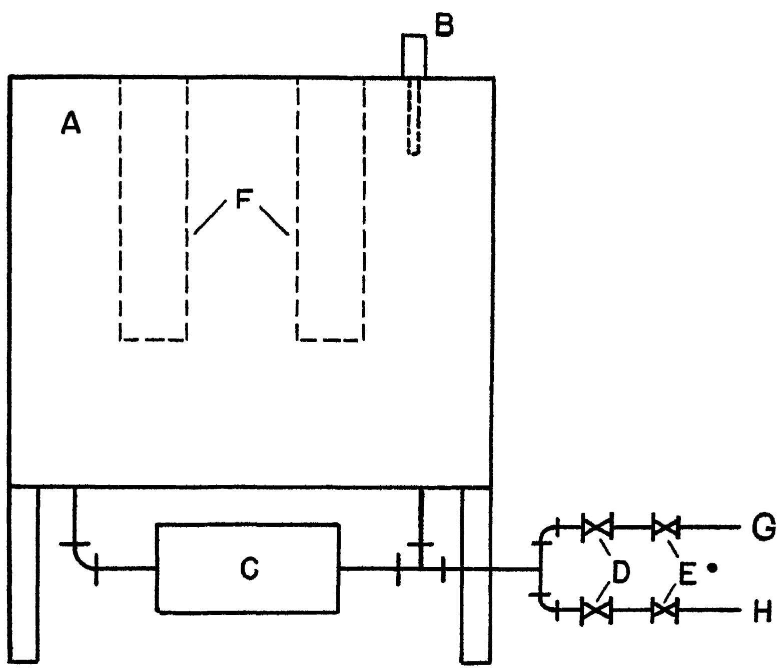
In operation, the system is extremely simple. The tanks containing the processing solutions are set in the water jacket, and temperature is controlled by mixing small quantities of hot and cold water alternately in the jacket.

The admission of hot and cold water into the system is controlled by the thermostat inserted into the water jacket. This thermostat, in conjunction with suitable relays, operates two solenoid valves through which hot and cold water alternately are bled into the circulating water in the jacket. As the temperature of the water falls slightly below the operating point of the thermostat, hot water enters the system, and when the temperature consequently rises slightly above normal, the hot water is shut off and cold water enters. The actual amount of water bled into the circulating system is adjusted by means of valves so that the heating and cooling cycle requires from 1 to 3 minutes. The cycle repeats itself at more or less regular intervals. The water in the jacket is thus maintained at the average temperature for which the thermostat is set. The thermostat used in this laboratory is pre-set at 68° F. and has an operating differential of less than 0.1° F.



Schematic diagram of temperature controlled water jacket for film processing. *A*—water-jacket tank. *B*—thermostat. *C*—circulating pump. *D*—solenoid valves controlled by thermostat. *E*—hand valves to regulate rate of flow. *F*—solution tanks. *G* and *H*—hot and cold water supply lines.

A centrifugal pump, placed conveniently under the water jacket tank, keeps the water in the jacket in continuous circulation and mixes the incoming tempering water with it thoroughly and rapidly The exact rate of circulation is unimportant provided only that it is rapid enough to prevent the formation of layers of hot and cold water. Without this circulation the tempering water cannot be blended satisfactorily with the rest of the water in the jacket and very poor temperature control results.

The amount of hot and cold water required depends upon the temperatures at which they are available, but ordinarily does not exceed about one gallon per minute for a 50-gallon water jacket. Where the temperature of the cold water from the city mains rises above 65° F. as it does in the warmer climates during the summer months, some source of refrigerated water is essential. However, since the amount of water required is small, this problem is not as serious as it is in systems where the water in the jacket is not recirculated.

The temperature of the processing solutions in the insert tanks follows the temperature swing of the water in the jacket much more slowly because of the time required for heat exchange between the solutions and the water in the jacket at these small temperature differences. As a result of this "inertia" the temperature of the processing solutions remains more nearly constant even than that of the surrounding water. Indeed, measurements have shown that under the described operating conditions the solutions do not vary by more than a few hundredths of a degree.

This high degree of accuracy in temperature control is obviously greater than is required for routine film processing, yet it is interesting to note that it is achieved without the use of expensive or intricate equipment. Control adequate for routine processing may be obtained within somewhat wider limits by using a more rugged thermostat and associated control circuits.

The system described offers several advantages. Very precise temperature control is obtainable within any required tolerance. The amount of water required is small—only a fraction of that required by non-circulating systems using a mixing valve. The apparatus is simple, rugged, inexpensive and easily available It requires no adjustment from day to day. It has even been adapted to portable equipment.

Effective Nursing Care for the Tuberculous

By CHESLEY BUSH, M. D., ESTA H. MCNETT, R. N., B. S., LUCILE PETRY, M. A., and MARTHA B. NAYLOR, R. N., B. S.*

"How can we provide effective nursing care in tuberculosis sanatoria?"

This question aroused so much interest at the Joint Annual Meeting of State Tuberculosis Control Officers and State Tuberculosis Sanatoria Hospital Directors in Detroit in May of this year that we have thought it worthwhile to review some of the facts that were brought out at that meeting. World War II, with its accompanying dislocation in medical and nursing services focused the attention of both lay and professional people sharply upon the problem of general nursing and tuberculosis nursing in particular. It is time to review these problems in the light of postwar conditions and the circumstances which may be expected to arise in years to come.

Throughout the field of nursing there is still a deficit of workers. The total number of employed professional nurses in the United States in the summer of 1948 was 280,500.[1] This number is actually much higher than it has ever been before, but the Women's Bureau of the United States Department of Labor estimated in 1947 that by 1950, 409,700 registered professional nurses will be needed to maintain standards of nursing care—129,200 more than the 1948 number. By 1955, the requirements will have risen to 477,700 and by 1960, 554,200 nurses will be needed in the United States.

Nursing needs have increased in spite of lower death rates, longer life expectancies, and a generally healthier population. The number of people in the United States has increased by an estimated 16,000,000 since the 1940 census. More people are now living to an older age than ever before, and consequently the diseases and disabilities of older people have multiplied. A high standard of living has prevailed since the early years of the war, medical prepayment plans have spread, and public health services have been expanded in many areas. In 1940, 10,087,000 patients were admitted to hospitals in the United States, but by 1948 the number of hospital admissions had risen to 16,422,000.[2]

The increasing need for nurses, the remarkable spirit of cooperation that developed during the war, and the present favorable general economic situation have helped to break down many of the rivalries

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[1] American Nurses' Association. Facts about Nursing, New York, 1948.

[2] All figures on hospital populations, beds, and nursing personnel are taken from the Journal of the American Medical Association, annual hospital numbers for appropriate years.

that once existed between trained professional nurses and practical nurses. During the war years when many professional nurses were in the armed services, nonprofessionals—practical nurses, aides, and other lay workers—helped to carry on a great part of the country's hospital nursing services. While many of these workers were untrained or only briefly trained on the job, this group (particularly as increasing numbers have been given instruction) are becoming regular members of the nursing team of which the graduate nurse is captain.

The number of practical nurses, attendants, aides, orderlies, and ward maids in all hospitals throughout the United States in 1948 was 225,000. It is difficult to estimate how many more are needed, or could be effectively used in relation to the number of professional nurses. Research on this subject is lacking and should be supplied.

An acute deficit of nurses also exists in the field of tuberculosis. This disease is now seventh on the list of causes of death in the United States and its death rate is constantly declining, but it still accounts for more than 5 percent of all the days spent in hospitals in this country. In 1948 there were 72,445 tuberculosis beds in all nonfederal hospitals registered with the American Medical Association with an average daily census of 58,210 patients. To care for these patients there were 5,295 graduate nurses, 6,288 practical nurses and 3,227 volunteer aides, orderlies, and ward maids. In some tuberculosis hospitals nonprofessionals give as much as 75 percent of the care to patients, and many sanatoria include ex-patients among their part-time auxiliary workers.

The accompanying table shows the changes that have taken place since 1941 in the average daily census in all hospitals and in tuberculosis hospitals. It also shows as far as possible, the number of nurses available to care for the patients. Before 1944, the statistics published by the American Medical Association did not include material on practical nurses, aides, orderlies, and maids in tuberculosis hospitals. Consequently, there is no record of how many were employed before that year.

As can be seen, the supply of nurses has increased rapidly, but the demand has increased even faster. The profession is faced with the necessity of providing more nurses to meet the added demand. How is this to be done?

Young women become nurses usually because to them nursing provides a satisfaction they can gain in no other profession. Dr. Esther Lucile Brown in "Nursing for the Future" (*1*) expresses this with special aptness: ". . . to witness and also to influence growth, development, and change not only in childhood but during all stages of life; to observe and treat the never absent but infinitely variable emotional component of disease; to be a participant in community

Professional and auxiliary nursing personnel and average daily census in registered hospitals and tuberculosis hospitals with the corresponding index for United States, 1941 to 1948, inclusive

Year	Average daily census	Graduate nurses	Practical nurses and attendants	Volunteer nurses' aides	Orderlies	Ward maids
	All registered hospitals [a]					
1941	1,087,039	[b] 112,842	112,334	N. R.	24,837	N. R.
1942	1,126,028	[b] 120,114	116,294	N. R.	25,857	N. R.
1943	1,257,124	[c] 126,591	109,736	34,801	31,110	N. R.
1944	1,299,474	125,458	88,114	48,859	37,368	29,751
1945	1,405,247	144,724	80,105	49,774	52,654	33,866
1946	1,239,454	146,002	96,092	12,804	37,234	31,422
1947	1,217,229	167,354	119,746	9,688	31,813	35,630
1948	1,217,154	196,120	141,834	11,512	35,788	35,867
	Index 1944=100.0 for all registered hospitals					
1944	100.0	100.0	100.0	100.0	100.0	100.0
1945	108.1	115.4	90.9	101.9	140.9	113.8
1946	95.4	116.9	109.1	26.2	99.6	105.6
1947	93.7	133.4	135.9	19.8	85.1	119.7
1948	93.7	156.3	161.0	23.6	95.8	120.5
	Tuberculosis hospitals [d]					
1944	58,475	4,138	4,277	251	1,593	1,301
1945	54,827	4,174	3,794	1,099	1,395	1,414
1946	55,678	4,261	4,286	154	1,489	1,643
1947	55,463	5,236	5,474	797	1,411	1,426
1948	58,210	5,295	6,288	182	1,369	1,676
	Index 1944=100.0 for tuberculosis hospitals					
1944	100.0	100.0	100.0	100.0	100.0	100.0
1945	93.8	100.9	88.7	437.8	87.6	108.4
1946	95.2	103.0	100.2	61.4	93.5	126.0
1947	94.8	126.5	128.0	317.5	90.5	109.4
1948	99.5	128.0	147.0	72.5	85.9	128.5

N. R.—No reported data.
[a] Federal and nonfederal hospitals.
[b] Graduate nurses actually employed.
[c] Including private duty nurses.
[d] Data for nonfederal hospitals only.

SOURCE: Hospital Service in the United States. Journal of the American Medical Association, annual hospital numbers for selected years.

efforts to protect health and to condition persons in the maintenance of health. What is the importance of 'unpleasant tasks' when compared with opportunities such as these?"

Unfortunately, many hospitals today are so badly understaffed that nurses cannot give time to the niceties of care. Tuberculosis, because it is a chronic, communicable disease, often causes a serious dislocation in the life of a patient. In addition to medical treatment, a patient in a sanatorium must be given a sense of well-being and freedom from strain and worry. Yet the hasty care a nurse is too often obliged to give does not foster this sense that is so important for recovery. Nurses themselves are painfully aware of this contra-

diction to their own standards of nursing. If the pressure and haste, the mechanization of nursing, that both tuberculosis and general nurses cite most frequently as a source of dissatisfaction in their work—if these can be eliminated, many more young women will wish to enter the profession.

In tuberculosis hospitals the nurse is likely to be even more pressed for time than in general hospitals. An accepted recommendation of standards for nursing services in tuberculosis hospitals has long been the following: 3.3 bedside nursing hours per 24 hours per bed-surgical patient; 2.7 bedside nursing hours per bed-medical patient; 1.5 bedside nursing hours per semi-ambulant patient; 0.5 bedside nursing hours per ambulant patient (*2*).

But 11 years have passed since these recommendations were made, and almost none of the tuberculosis hospitals and sanatoria have been able to employ enough nurses to make such a standard possible in actual practice.

Another source of a nurse's satisfaction in her work has always been the sense of sharing the scientific understanding and confidence of the doctor in the treatment of patients. The doctor who makes the nurse a member of the medical team, who treats her with respect and consideration, who is aware of her contribution to treatment, and gives recognition to it, helps to make nursing a more attractive profession.

Salary is not the nurse's primary consideration. Yet, while the cost of living has increased since the war and nurses' salaries have also increased, they have not risen proportionately. No nation-wide survey of salaries in tuberculosis hospitals has been made, but recent studies of several typical tuberculosis facilities have indicated that the total value of minimum salaries for staff nurses usually varies from about $175 to $245 a month, including maintenance. Maximum salaries range from about $185 to $269, but increases are slow. Some hospitals provide rooms, meals or laundry services for their nurses, but others provide neither services nor allowances to meet the cost of the services outside the hospital.

Hours, according to the studies which have been made, are likely to be more satisfactory in tuberculosis services of general hospitals than in sanatoria. Many tuberculosis hospitals have two shifts a day, while the general hospitals nearly always have three. Split shifts and 6-day weeks are common in sanatoria, but the 8-hour day and 5½-day week are the rule in general hospitals. The American Nurses' Association in its official Economic Security Program asks a 40-hour week with an 8-hour straight-time work day for all nurses and remuneration for overtime and on-call service.

Sanatorium nurses work from 44 to 67 hours a week, while the

average workweek for other nurses is about 44 hours. Although their over-all salaries are in general comparable, on an hourly basis the sanatorium nurses are less well paid. Some hospitals pay extra for night duty, and a few general hospitals give cash bonuses ranging from $10 to $50 a month for tuberculosis nursing. Policies of wages and hours in tuberculosis sanatoria should be checked against the improvements that have already taken place in general hospitals if the sanatoria are to compete on an equal footing with general hospitals for nurses.

Vacation policies are more or less uniform. The average hospital, either tuberculosis or general, grants its nurses 2 weeks with pay. Nurses in the latter are likely to have more holidays, but paid sick leave of 12–15 days is about the same for both types of hospital. Health insurance, hospitalization, and retirement policies need to be liberalized for both.

If improvements are made to guard tuberculosis nurses against infection, more women will undoubtedly be attracted to this branch of nursing. In fact, careful observance of safe techniques in caring for communicable disease cases may make tuberculosis nursing even safer than general nursing where there is danger from unrecognized cases.

Before a nurse is assigned to duty on a tuberculosis service, she should have a general physical examination, a chest X-ray, and a tuberculin test. Each of these procedures should be repeated at intervals for the protection of the nurse. Many authorities also recommend BCG vaccination for nonreactors to tuberculin. But studies show that few tuberculosis hospitals give prospective nurses routine preemployment physical examinations, and some do not even give tuberculin tests, although preemployment X-ray is done almost everywhere.

Nurses who have been assigned to tuberculosis services after having passed a physical examination and whose chest X-rays are satisfactory must be given protection on the job. The following recommendations have been made (*3*).

1. Stop the spread of all organisms insofar as possible from the source:

   (*a*) By providing the best practical methods of collecting and destroying all body discharges contaminated by tubercle bacilli;

   (*b*) By trying to interest and teach the patient and members of his family in regard to their responsibilities for helping with these procedures.

2. Improve all hospital housekeeping procedures to the point where the dissemination of disease-producing organisms, tubercle bacilli, are—insofar as possible—eliminated from the environment. (The handling of soiled linen and the care of eating utensils should be included in housekeeping.)

3. Initiate all practical *aseptic* nursing procedures possible in order to provide a clean service for the individual patient and at the same time introduce *protective measures* for all workers coming in contact with infectious tuberculosis patients.

Wherever better care of tuberculous patients has been demonstrated and better protection for workers has been made easily accessible, it has become easier to recruit and retain personnel.

Cleanliness is the keystone of asepsis. An investment in hand-washing basins, up-to-date laundry and kitchen equipment, gowns and masks will prove sound because it will increase the number of nurses a sanatorium can attract and will enable the nurses to give better care to patients. Many tuberculosis hospitals fail to meet these standards, sometimes because of lack of personnel and equipment, sometimes simply because of carelessness.

Improvements in recreation and transportation can also help to increase the inducements of tuberculosis nursing. In the past, sanatoria have nearly always been located in the country, but there is now an increasing interest in building new tuberculosis wings and sanatoria close to general medical facilities. This practice will undoubtedly make it possible for additional nurses to enter tuberculosis nursing.

More student nurses will also be drawn to tuberculosis nursing if schools of nursing offer better and safer instruction in tuberculosis. In 1946, only 24 percent of all schools of nursing offered any clinical experience in tuberculosis. Some superintendents say it is difficult to find tuberculosis services to which young student nurses can be safely entrusted. Yet the only places in which clinical practice can be effectively taught are those where scrupulous communicable disease techniques are observed.

In order to raise educational standards in tuberculosis nursing, the National League of Nursing Education, in 1946, appointed a Subcommittee on Tuberculosis Nursing to prepare a basic plan of instruction. Under the co-sponsorship of the Joint Tuberculosis Nursing Advisory Service the committee has worked out a plan in which tuberculosis takes a place more nearly commensurate with its importance as a public health problem. The new instructional plan, published in July 1949, calls for 45 to 60 hours of instruction in tuberculosis in contrast to the 1937 recommendation of 11 hours. It urges that the increased hours should be accompanied by enrichment of content, pointing out that well-planned courses in tuberculosis nursing can provide a variety of experiences in epidemiology, case finding, communicable disease technique, economic and social aspects of treatment, patient education and rehabilitation. The instruction should also include a study of the magnitude of the tuberculosis problem, the part played by all nurses in the program for its eradication and a general survey of local, State, and Nation-wide antituberculosis campaigns.

Professional nurses are now being asked to assume many new responsibilities that only doctors used to carry, such as giving intravenous treatments and obtaining specimens of gastric contents. If more intensive training is given them to meet these new responsibilities, many of their less demanding duties may be conducted by practical nurses, provided an appropriate system of training and supervision is designed for them. In some communities vocational high schools are giving courses in practical nursing with clinical instruction and practice in selected community hospitals.

A training period of 9 to 12 months seems sufficient for training practical nurses. Most experts think they should be trained in general nursing and that tuberculosis hospitals should draw from this pool.

There is an increasing acceptance of minority groups and of men in nursing schools and in the profession itself. If tuberculosis nursing is made attractive enough, it will draw its share of both sexes and from minority groups.

Up to now there has been almost no systematic analysis of the different jobs to be done in a tuberculosis hospital. Until such investigations are made, workers will continue to be trained in a vacuum. No one can be properly trained for a specific job until the job itself has been defined. The present haphazard "system," with overlapping duties for graduate nurses, practical nurses, aides and orderlies, leads to inefficiency both in hospital operation and in training programs. *Job analyses are urgently needed.*

It is also important that sanatoria budget the time of their workers in such a way that they can serve as efficiently as possible. Too often nurses have to do part of the housekeeping, using valuable time that could be much more productively spent in bedside care. Every hospital, after it has made its job analyses, should try to use the talents and training of its workers to the best advantage.

Each State should determine its own nursing needs, for each has its own problems. Nurses tend to leave States where conditions are unfavorable for those where policies are more progressive. Each State should make a survey to find out how many nurses are needed for the various types of service, how many can be trained to meet the needs and how conditions of nursing can be improved so that nurses will not look elsewhere for employment when their training is finished. When a State has determined the specific steps that must be taken to make it self-sufficient in nursing services, it can proceed on a rational basis to develop them.

What then can be done to increase the number of nurses for tuberculosis nursing services in the United States? It is hoped that this

brief discussion will have pointed out many of the positive steps that can be taken: increasing job satisfaction, better precautions against infection, better instruction of nurses and auxiliaries in tuberculosis nursing, salary adjustments, better hours, increased employment of members of minority groups, job analyses, better utilization of time.

Although it is not inevitable that nursing care will become more effective as the number of nurses increases, the profession considers the quantity of nurses one index of the quality of patient care. If our society can provide enough nurses to staff its hospitals adequately, each nurse will do her utmost to give the kind of patient care for which she has dedicated herself to her profession. Tuberculosis hospitals, if they keep pace with developments, will share in the improvement of nursing services everywhere.

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Characteristics of Commercial X-ray Screens and Films—VIII

By Willard W. Van Allen, B. Sc.*

This is the eighth in a series of reports on the characteristics of commercial X-ray film-screen-developer combinations. The following tables represent the accumulated and revised findings of the Electronics Laboratory to date. An earlier issue of this journal[1] described the technical details of this investigation.

Table 1. *Speed of fluoroscopic screen-film-developer combinations* [1 2]

Film and developer [3]	Screens								
	D sample 1	D sample 2	D sample 3	666D sample 1	666D sample 2	E-2	B sample 1	B sample 2	B-2
Ansco Fluorapid:									
Eastman X-ray	120	150	155	100	125	-------	-------	-------	-------
Ansco Liquadol	105	125	140	75	100	-------	-------	-------	-------
G. E. Supermix	155	170	200	100	130	-------	-------	-------	-------
Eastman Rapid	135	145	165	85	110	-------	-------	-------	-------
Buck X-ray	115	125	140	75	100	-------	-------	-------	-------
DuPont Fluorofilm:									
Eastman X-ray	95	115	130	80	100	-------	-------	-------	-------
Ansco Liquadol	90	110	120	65	85	-------	-------	-------	-------
G. E. Supermix	130	145	165	90	110	-------	-------	-------	-------
Eastman Rapid	100	110	125	65	85	-------	-------	-------	-------
Buck X-ray [4]	-------	-------	-------	-------	-------	-------	-------	-------	-------
Eastman Blue Photoflure:									
Eastman X-ray	95	115	130	75	100	-------	-------	-------	-------
Ansco Liquadol	85	105	115	65	85	-------	-------	-------	-------
G. E. Supermix	110	120	145	75	95	-------	-------	-------	-------
Eastman Rapid	105	110	130	75	90	-------	-------	-------	-------
Buck X-ray	140	150	175	90	115	-------	-------	-------	-------
Eastman Green Photoflure:									
Eastman X-ray	-------	-------	-------	-------	-------	140	60	70	95
Ansco Liquadol	-------	-------	-------	-------	-------	120	55	55	85
G. E. Supermix	-------	-------	-------	-------	-------	155	75	75	110
Eastman Rapid	-------	-------	-------	-------	-------	115	50	55	80
Buck X-ray	-------	-------	-------	-------	-------	110	50	55	75

[1] Speeds are determined with film and screen in direct contact and therefore do not represent the over-all speed of the same combinations when used in a photofluorograph.
[2] Subsequent reports will contain data on additional developers used in combination with the screens and films shown in this table; these will include Eastman Liquid X-ray and DuPont developers.
[3] Development time (as recommended by the manufacturer of the developer): Eastman X-ray Developer, 8 minutes; Ansco Liquadol, 4 minutes; G. E. Supermix, 8 minutes; Eastman Rapid, 8 minutes except Green Photoflure, 7 minutes; Buck X-ray, 8 minutes except Green Photoflure, 7 minutes. All developments at 68° F.
[4] DuPont Fluorofilm reported currently unavailable.

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[1] Pub. Health Rep. 64: 581 (1949).

Table 2. *Speed of intensifying screen-film-developer combinations* [1]

Film and developer [2]	Screens								
	Buck			Eastman			Patterson		
	Xtra speed	Mid-speed	Definition	Ultra speed	Fine grain	Definition	High speed	Par-speed	Detail
Ansco High Speed: [3]									
Ansco Liquadol	70	60	50	110	85	60	115	60	20
G. E. Supermix	75	60	50	110	85	60	115	65	20
Eastman Rapid	65	55	45	100	75	55	100	55	20
Buck X-ray	65	50	45	100	75	50	100	55	20
DuPont No. 508:									
Eastman X-ray	55	50	40	90	70	50	80	55	20
Ansco Liquadol	50	45	40	85	65	45	85	50	15
G. E. Supermix	55	45	40	80	65	45	80	50	15
Eastman Rapid	45	40	30	65	55	40	65	40	15
Buck X-ray	50	40	35	75	60	40	75	45	15
Eastman Blue Brand:									
Eastman X-ray	85	70	60	140	110	80	120	90	25
Ansco Liquadol	90	75	65	145	110	75	130	80	25
G. E. Supermix	90	75	65	145	105	75	135	80	25
Eastman Rapid	75	65	55	120	90	65	105	60	25
Buck X-ray	85	70	60	140	105	70	130	80	25

[1] Subsequent reports will contain data on additional developers used in combination with the films and screens shown in this table; these will include Eastman Liquid X-ray and DuPont developers.

[2] Development time (as recommended by the manufacturer of the developer): Eastman X-ray, 4½ minutes; Ansco Liquadol, 3 minutes; G. E. Supermix, 3 minutes; Eastman Rapid, 3½ minutes; Buck X-ray, 3 minutes.

[3] Speeds with Eastman X-ray developer to be reported in a subsequent issue.

Table 3. *Average value of fog and contrast (gamma)* [1]

Film	Fog densities					Contrast (gamma)				
	Developer [2]					Developer [2]				
	Eastman X-ray	Ansco Liquadol	G. E. Supermix	Eastman Rapid	Buck X-ray	Eastman X-ray	Ansco Liquadol	G. E. Supermix	Eastman Rapid	Buck X-ray
Photofluorographic:										
Ansco Fluorapid	0.08	0.09	0.23	0.12	0.25	2.1	1.8	2.1	2.0	1.9
DuPont Fluorofilm	.21	.15	.40	.20	([3])	1.9	2.0	2.1	1.9	([3])
Eastman Blue Photoflure	.07	.04	.09	.05	.15	1.8	1.8	1.9	1.7	1.8
Eastman Green Photoflure	.10	.11	.28	.09	.26	2.0	2.1	2.3	2.2	2.4
Roentgenographic:										
Ansco High Speed	-------	.10	.10	.04	.07	------	2.8	2.8	2.3	2.3
DuPont No. 508	.18	.20	.04	.04	.07	2.6	2.7	2.6	2.2	2.2
Eastman Blue Brand	.06	.08	.06	.05	.07	2.8	3.0	-------	3.2	2.9

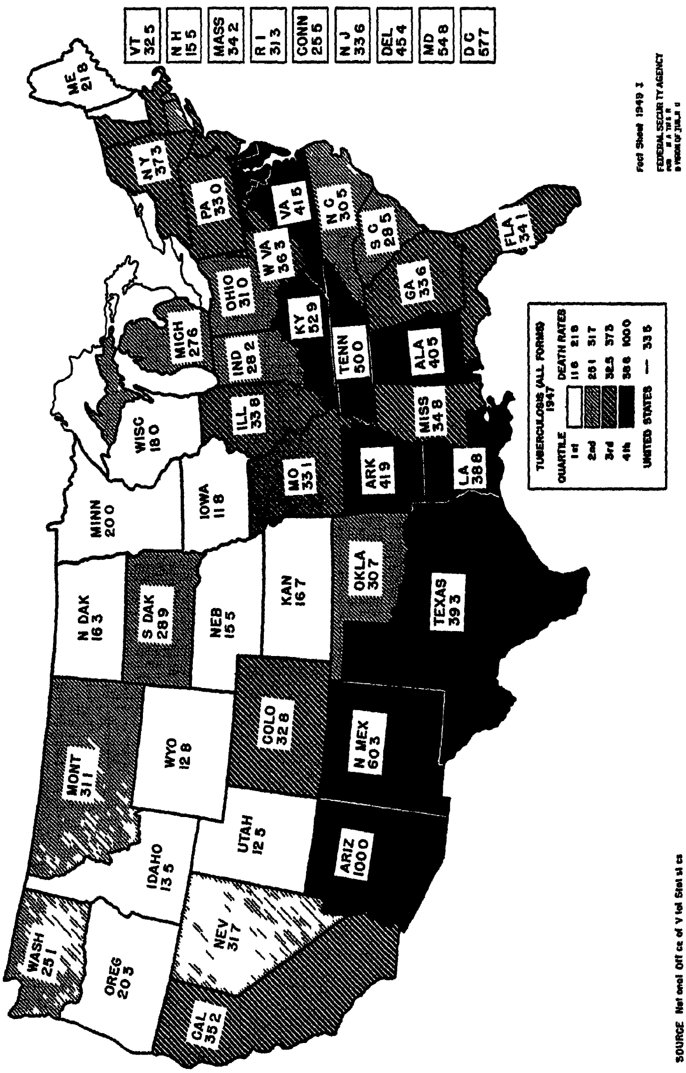
[1] Values obtained with open-tank development and continuous mechanical agitation at 68° F. Values for fog densities obtained in open tank without agitation have been found generally lower.

[2] Development time as given in tables 1 and 2. Similar data for other developers will appear in subsequent issues.

[3] DuPont Fluorofilm reported currently unavailable.

TUBERCULOSIS (ALL FORMS) DEATH RATES PER 100,000 POPULATION – UNITED STATES, 1947

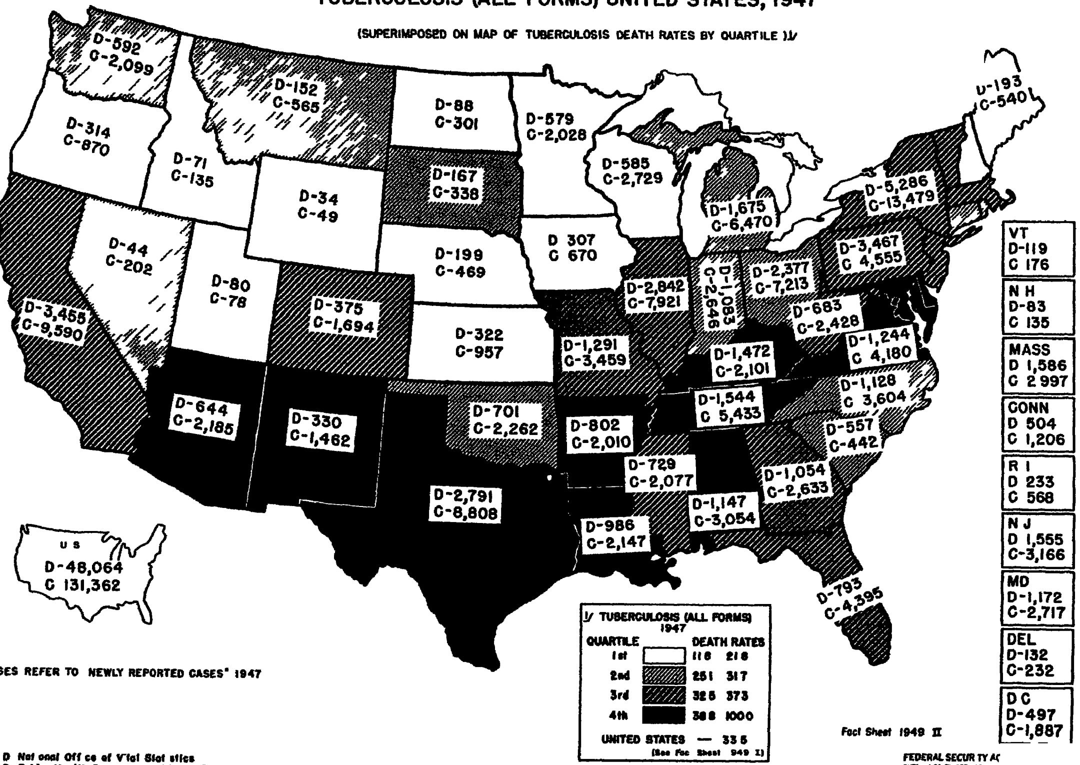
(BY PLACE OF RESIDENCE)



SOURCE National Office of Vital Statistics

NUMBER OF DEATHS AND CASES a/
TUBERCULOSIS (ALL FORMS) UNITED STATES, 1947

(SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE 1/)



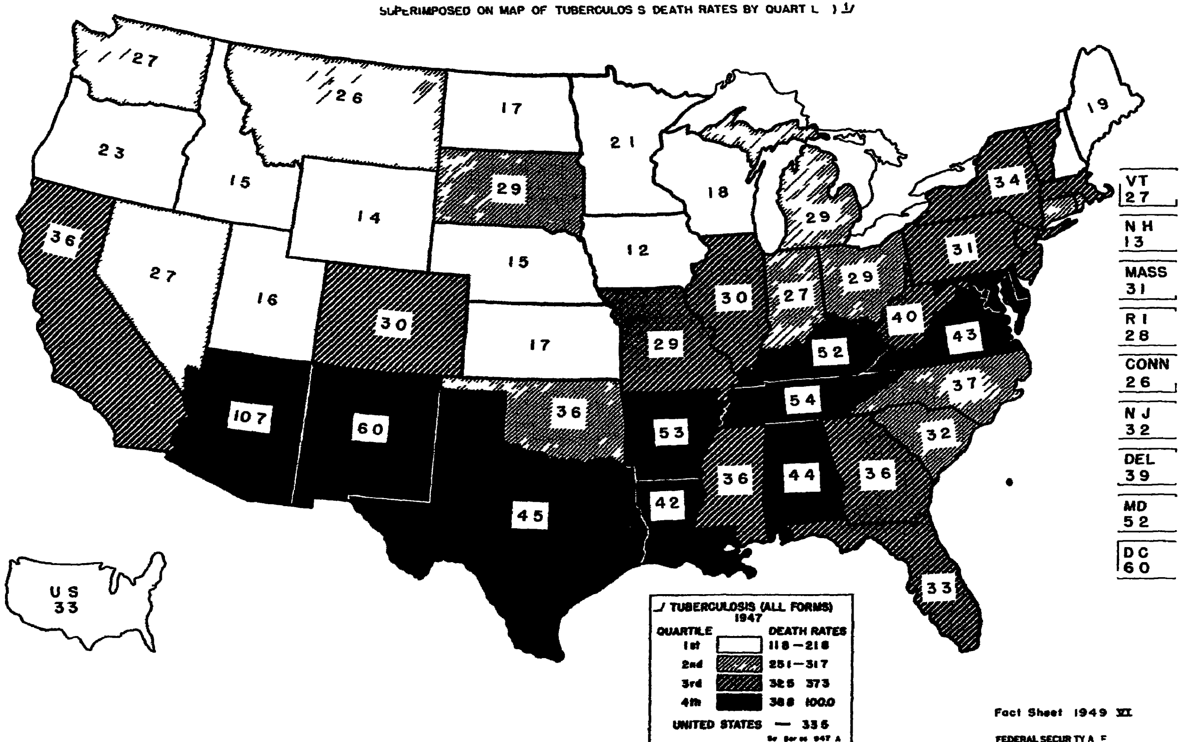
NOTE
a/CASES REFER TO NEWLY REPORTED CASES' 1947

SOURCE D Nat onal Off ce of V tal Stat stics
C Public Health Reports, Vol 63 No 12 March 19 1948, and D strict of Columbia Health Dept

TUBERCULOSIS PROPORTIONATE MORTALITY – UNITED STATES, 1947

TUBERCULOSIS DEATHS PER 100 DEATHS ALL CAUSES

SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE 1/



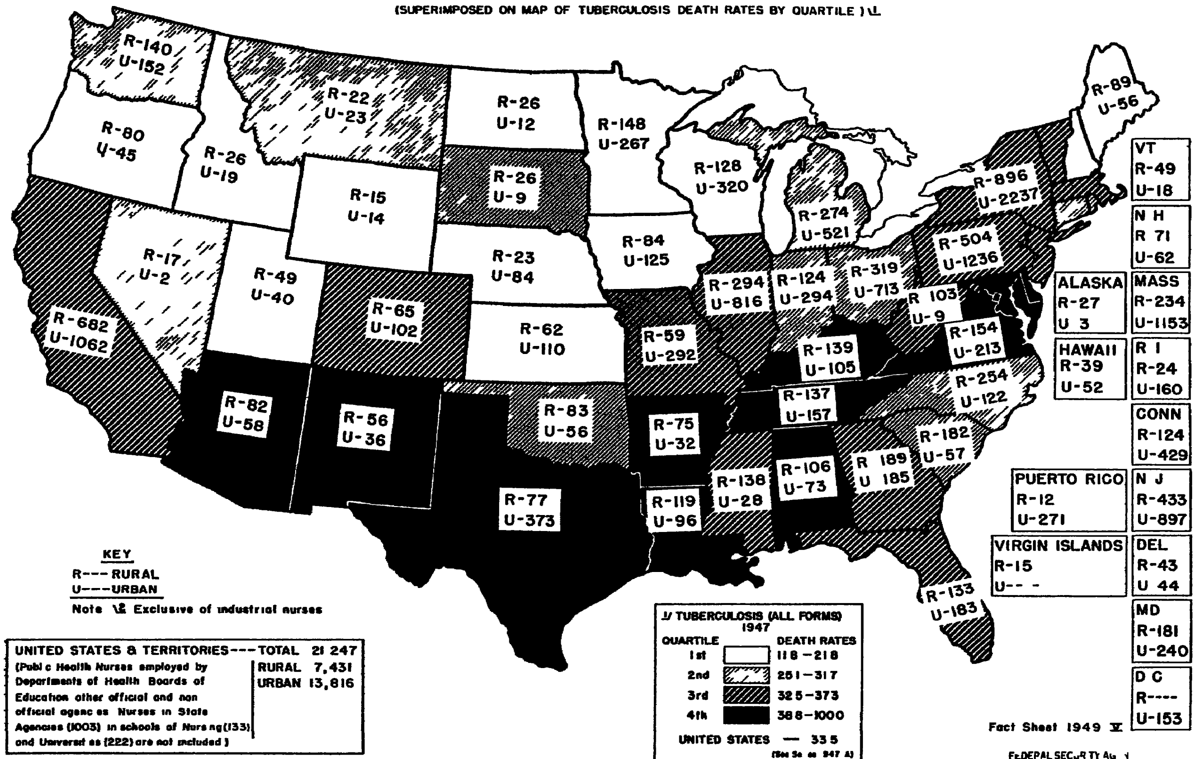
SOURCE NOVS News Release 2 5 48

Fact Sheet 1949 VI

FEDERAL SECURITY A

NUMBER OF RURAL AND URBAN PUBLIC HEALTH NURSES[2] JANUARY 1, 1948

(SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE)[1]



SOURCE PHS Office of Public Health Nursing

FEDERAL SECURITY AG

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 16, 1949

A total of 1,016 cases of poliomyelitis was reported, as compared with 684 last week (an increase of 48.5 percent), and a 5-year (1944–48) median of 427. Current totals by geographic divisions (last week's figures in parentheses) are as follows: New England 45 (24), Middle Atlantic 93 (24), East North Central 166 (76), West North Central 174 (101), South Atlantic 36 (31), East South Central 66 (57), West South Central 295 (271), Mountain 40 (32), Pacific 101 (68). The 18 States reporting more than 15 cases each (last week's figures in parentheses) are as follows: *Increases*—Massachusetts 19 (8), New York 72 (16), Ohio 22 (12), Indiana 52 (24), Illinois 55 (19), Michigan 32 (11), Minnesota 51 (38), Iowa 30 (8), Missouri 40 (17), North Dakota 16 (5), Kentucky 20 (13), Mississippi 17 (13), Arkansas 101 (70), California 83 (58); *decreases*—Kansas 19 (25), Texas 112 (121); *no change*—Tennessee 21, Oklahoma 74. The total reported since March 19 (average week of seasonal low incidence) is 3,971 cases, as compared with 3,251 for the same period last year and a 5-year median of 1,489.

Of 17 cases of Rocky Mountain spotted fever reported (last week 20, 5-year median 32), 10 occurred in 4 South Atlantic States (5 in Virginia, 3 in North Carolina), 2 in Alabama, and 1 case each in Pennsylvania, Indiana, Montana, Colorado, and Oregon. The total to date is 275, same period last year 252, 5-year median 220.

Included in the total of 104 cases of typhoid and paratyphoid fever reported (last week 112, 5-year median 133), are 17 cases in Texas (including 5 paratyphoid fever), 11 in Louisiana, 7 in Pennsylvania (last week 10), and 6 each in Virginia, Arkansas, and Oklahoma. The total since March 19 (average week of seasonal low incidence) is 1,049, same period last year 1,187, 5-year median 1,346.

Deaths recorded during the week in 94 large cities in the United States totaled 8,320, as compared with 9,359 last week, 8,674 and 8,319, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,319. The total for the year to date is 264,454, as compared with 267,301 for the same period last year. Infant deaths totaled 617, last week 695, 3-year median 654. The cumulative figure is 18,167, same period last year 18,889.

Telegraphic case reports from State health officers for week ended July 16, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Small pox	Tularemia	Typhoid and paratyphoid fever [c]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	...	...	...	20	...	9	13	...	3	...	...	...	9	...
New Hampshire	...	...	...	...	...	...	2	...	...	...	...	...	...	...
Vermont	...	...	...	16	...	...	...	...	9	...	...	...	1	...
Massachusetts	8	...	...	90	...	...	19	...	20	...	...	1	119	...
Rhode Island	...	...	...	6	...	2	...	...	1	...	...	...	...	...
Connecticut	...	...	...	111	1	13	11	...	7	...	...	2	20	...
MIDDLE ATLANTIC														
New York	5	...	[e] 1	503	8	160	72	...	[d] 31	...	...	3	199	4
New Jersey	...	1	1	393	2	31	[1] 14	...	5	...	...	...	78	...
Pennsylvania	4	...	([e])	302	4	...	7	1	14	...	...	7	79	...
EAST NORTH CENTRAL														
Ohio	5	...	1	480	3	43	22	...	25	...	...	2	81	5
Indiana	4	1	...	25	...	...	52	1	5	...	...	3	17	17
Illinois	...	2	1	223	3	60	55	...	20	...	1	1	120	1
Michigan [a]	2	2	1	247	3	29	32	...	32	...	...	1	74	7
Wisconsin	...	...	...	532	...	2	5	...	20	...	...	...	75	...
WEST NORTH CENTRAL														
Minnesota	...	1	...	57	1	...	51	...	4	...	...	1	2	...
Iowa	...	...	...	19	...	2	30	...	3	...	...	...	9	5
Missouri	1	...	...	10	1	4	40	...	7	...	...	5	3	...
North Dakota	1	1	...	22	1	...	16	...	2	...	...	...	3	...
South Dakota	...	...	...	2	...	...	5	...	...	...	...	...	...	...
Nebraska	...	...	...	4	...	...	13	...	...	...	...	...	...	...
Kansas	1	...	...	25	1	5	19	...	1	...	...	...	3	...
SOUTH ATLANTIC														
Delaware	...	...	...	9	...	...	...	...	...	...	...	...	6	...
Maryland [a]	5	...	...	31	...	14	2	1	[d] 5	...	...	1	17	...
District of Columbia	...	...	...	23	1	11	1	...	2	...	...	...	1	...
Virginia	1	...	75	117	1	27	4	5	7	...	2	6	41	3
West Virginia	1	...	...	4	...	...	9	1	4	...	...	...	13	...
North Carolina	5	...	...	137	2	...	5	3	7	...	...	...	28	...
South Carolina	1	...	13	87	...	13	1	...	1	...	...	2	3	4
Georgia	7	...	1	76	2	28	11	...	2	...	...	5	4	8
Florida	3	...	5	46	...	4	3	...	2	...	...	...	1	...

EAST SOUTH CENTRAL														
Kentucky	2			35		20	20		5			3	17	8
Tennessee	3		4	15		35	21					5	36	
Alabama	2		5	15		29	8	2				1	5	3
Mississippi [a]	1	1	3	5	1	8	17		3	(1)	1	2		
WEST SOUTH CENTRAL														
Arkansas			1	20		20	101		2		6	6	26	1
Louisiana			1	10	1	19	8				1	11		3
Oklahoma	3		6	17	3	7	74		6		3	6	2	5
Texas	9		252	97	6	147	112		11		2	17	137	17
MOUNTAIN														
Montana			5	34		1		1	1		1	1	2	
Idaho	1		6	30		2	14		d 2			3	5	
Wyoming				4		6						1		
Colorado	2		1	45		13	12	1	1				4	
New Mexico				18		1	6		1			1		1
Arizona	1		15	27		4	3		3			1	18	
Utah [a]				42		4	2		1				26	
Nevada							3							
PACIFIC														
Washington			2	45		1	12		5				9	
Oregon	1		1	30		5	6	1	2			1	22	
California	5	1		211	6	29	83		d 35			5	87	
Total	84	10	401	4,317	51	808	1,016	17	317		17	104	1,402	
Median, 1944–48	151	11	584	3,390	81		427	32	855	5	28	133	2,203	
Year to date 28 weeks	3,852	289	75,113	578,930	2,097	51,759	1 4,895	275	57,287	1 39	676	1,509	30,168	
Median, 1944–48	6,435	248	189,238	533,201	4,110		1,752	220	83,792	254	531	1,821	53,039	
Seasonal low week ends	(27th) July 9		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32d) Aug. 14	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	84		111,383	631,323	2,941		1 3,971		79,985	1 49		1,049	40,201	
Median, 1943–48 [b]	151		333,425	569,415	5,614		1,489		122,363	337		1,346	83,683	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for diphtheria poliomyelitis and typhoid fever, the corresponding periods are 1944–45 to 1948–49.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately, as follows: New York 1, Virginia 2, South Carolina 1, Georgia 2, Louisiana 2, Oklahoma 1, Texas 5, California 1. Cases reported as Salmonella infection, not included in the table, were as follows: Massachusetts 1, New York 1.

Leprosy: California 1.

Relapsing fever: California 1.

[1] Correction: Poliomyelitis, New Jersey, week ended May 7, 3 (instead of 5 cases). Smallpox, Mississippi, week ended June 11, 0 (instead of 1 case).

Alaska: Pneumonia 1.

Hawaii Territory: Measles 19, lobar pneumonia 1.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended June 25, 1949.—During the week ended June 25, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		13		119	384	25	116	31	100	788
Diphtheria				1	1				1	3
Dysentery:										
Amebic					1					1
Bacillary				1						1
Encephalitis, infectious					2		1			3
German measles		14		89	50	1	26	57	22	259
Influenza		16				3				19
Measles		27	1	224	266	191	307	235	409	1,660
Meningitis, meningococcal				1						1
Mumps		25	1	22	188	15	2	14	92	359
Poliomyelitis				2	5	2			4	13
Scarlet fever		1		44	44	1		4	14	108
Tuberculosis (all forms)		14	11	85	43	25	21		58	257
Typhoid and paratyphoid fever				4		1			3	8
Undulant fever				1	3			1		5
Venereal diseases:										
Gonorrhea		11	5	68	70	35	23	38	70	320
Syphilis		2	9	66	29	4	5	5	17	137
Whooping cough		4		40	20	12			3	79

NORWAY

Notifiable diseases—March 1949.—During the month of March 1949, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	12	Mumps	830
Diphtheria	27	Paratyphoid fever	4
Dysentery, unspecified	1	Pneumonia (all forms)	2,730
Erysipelas	317	Poliomyelitis	10
Gastroenteritis	1,996	Rheumatic fever	121
Gonorrhea	300	Scabies	1,886
Hepatitis, epidemic	112	Scarlet fever	330
Impetigo contagiosa	2,029	Syphilis	88
Influenza	4,338	Tuberculosis (all forms)	480
Laryngitis	12,159	Typhoid fever	1
Lymphogranuloma, inguinale	1	Whooping cough	3,183
Measles	4,068		

JAMAICA

Notifiable diseases—4 weeks ended June 25, 1949.—For the 4 weeks ended June 25, 1949, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	14	29	Leprosy		3
Diphtheria	3		Puerperal sepsis		1
Dysentery		1	Tuberculosis (pulmonary)	50	43
Erysipelas	1	1	Typhoid fever	4	20

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

CHOLERA

Burma—Bassein.—During the period June 12–25, 1949, 11 cases of cholera were reported in Bassein, Burma. The Government of Burma declared Bassein to be infected with cholera on May 8, 1949.

India—Calcutta–Cawnpore–Madras.—During the two weeks ended July 9, 1949, 125 cases of cholera were reported in Calcutta, 13 cases in Cawnpore, and 37 cases in Madras.

Pakistan—Chittagong.—During the week ended July 9, 1949, 2 cases of cholera were reported in Chittagong.

PLAGUE

Belgian Congo—Costermansville and Stanleyville Provinces.—On July 2 a fatal case of plague was reported in the village of Rweso, northeast of Lubero, Costermansville Province, and on July 4 a fatal case was reported in the village of Ndoangu, northwest of Blukwa, Stanleyville Province, both localities being new foci of the disease.

SMALLPOX

Colombia—Antioquia Department.—During the month of May 1949, 50 cases of smallpox were reported in the Department of Antioquia, Colombia.

Egypt—Alexandria.—During the week ended June 24, 1949, 3 cases of smallpox were reported in Alexandria, Egypt.

Java—Batavia.—The smallpox incidence continues high in Batavia, with 268 cases reported during the week ended July 2, 1949, and 254 cases during the week ended July 9.

Mexico—Mexico City (D. F.).—During the period June 19–July 2, 1949, 7 cases of smallpox were reported in Mexico City (D. F.).

Venezuela—Puerto La Cruz.—During the week ended July 2, 1949, 1 case of smallpox (alastrim) was reported in Puerto La Cruz, Venezuela.

TYPHUS FEVER

Ethiopia.—During the period May 1–28, 1949, 117 cases of typhus fever were reported in Ethiopia, of which 74 cases occurred in Shoa between May 3 and 16.

Colombia—Antioquia Department.—During the month of May 1949, 125 cases of typhus fever, with 1 death, were reported in the Department of Antioquia, Colombia.

YELLOW FEVER

No reports of yellow fever were received during the week.

DEATHS DURING WEEK ENDED JULY 9, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended July 9, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,359	8,483
Median for 3 prior years	8,810	
Total deaths, first 27 weeks of year	256,134	258,627
Deaths under 1 year of age	695	612
Median for 3 prior years	747	
Deaths under 1 year of age, first 27 weeks of year	17,548	18,249
Data from industrial insurance companies:		
Policies in force	70,327,350	71,000,401
Number of death claims	9,750	10,508
Death claims per 1,000 policies in force, annual rate	7.2	7.7
Death claims per 1,000 policies, first 27 weeks of year, anual rate	9.4	9.8

—Announcement—

The Forty-eighth Annual Conference of the Surgeon General of the Public Health Service and the Chief of the Children's Bureau with the State and Territorial Health Officers, State Mental Health Authorities, and State Hospital Survey and Construction Authorities will be held in the Federal Security Building in Washington, October 19-22, 1949.

The Division of State Grants in the Bureau of State Services is coordinating plans for this conference which is held concurrently with the annual meeting of the Association of State and Territorial Health Officers.

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS. first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.
Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 AUGUST 12, 1949 NUMBER 32

IN THIS ISSUE

Hospital Survey and Construction Program

Milk Sanitation Ratings

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

CONTENTS

	Page
Hospital survey and construction program. Progress report. Vane M. Hoge	991
Communities awarded milk sanitation ratings of 90 percent or more, July 1947–June 1949	1010
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended July 23, 1949	1013
Communicable disease charts	1016
Plague infection in Park County, Colorado	1017
Territories and possessions:	
Virgin Islands—Notifiable diseases—April–June 1949	1017
Deaths during week ended July 16, 1949	1017
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended July 2, 1949	1018
Japan—Notifiable diseases—4 weeks ended June 25, 1949, and accumulated totals for the year to date	1018
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Cholera	1019
Plague	1019
Smallpox	1019
Typhus fever	1020
Yellow fever	1020

Public Health Reports

Vol. 64 • AUGUST 12, 1949 • *No.* 32

Hospital Survey and Construction Program

—Progress Report—

By Vane M. Hoge, M.D.*

The Hospital Survey and Construction Act (Public Law 725, 79th Congress) launched a comprehenisve program of Federal-State cooperation to provide the country with adequate hospital and health center facilities. This article summarizes the accomplishments of the two and three-quarter years since the passage of the act in August 1946.

Description of the Program

The purpose of the act is to assist the States (1) to inventory and evaluate their existing hospital and health center facilities, to survey their needs for additional facilities and to develop programs for the construction of these facilities; and (2) to construct the needed public or other nonprofit hospitals and health centers in accordance with these programs.

To assist the States in surveys and planning, $3,000,000 were authorized to be appropriated. Funds appropriated pursuant to this authorization are allotted among the States on a population basis but with the proviso that no State is to receive less than $10,000. The Federal funds are available to pay one-third of the State's expenditures.

To assist in construction, $75,000,000 were authorized to be appropriated for the fiscal year ending June 30, 1947, and for each of the four succeeding years. These funds are allotted among the States in accordance with a formula based on population and per capita income, which gives considerably larger amounts per capita to low income States. To be eligible for allotments a State must submit a State plan and have it approved. One of the main requirements for approval is that the State must designate a single State agency to administer or supervise administration of the plan and provide for the designation of a State advisory council. The plan must set forth a hospital construction program based on the State-wide inventory of hospitals and survey of need; and establish the priority of projects included in the

*Assistant Surgeon General.

program. Further the plan must provide for construction, insofar as financial resources permit, in the order of relative need; provide appropriate methods of administration; and provide for the establishment of minimum standards (to be fixed at the discretion of the State) for the maintenance and operation of the hospitals to be constructed under the program.

The State's allotment may be drawn upon to pay one-third of the cost of approved projects within the State. Applications for Federal aid for the construction of facilities may be submitted by a public or nonprofit agency through the State agency. To be approved, they must meet certain requirements set forth in a later section of this report.

In the administration of the act the Surgeon General is advised by the Federal Hospital Council of eight members. Four of these are experts in hospital and health fields and four represent the consumers of hospital services.

Surveys and Planning

All of the States and Territories, with the exception of Delaware, the District of Columbia and the Virgin Islands, have taken advantage of Federal aid for survey and planning. At the time of the passage of the act, a good many States, either through an official or a nonprofit agency, were in process of surveying their existing hospital facilities. These surveys had been stimulated largely by the activities of the Commission on Hospital Care, an organization sponsored by the American Hospital Association. The act gave further encouragement to this movement and helped to provide a part of the funds required.

For aid to the States for surveys and planning, Congress has thus far appropriated $1,800,000. The State allotments from these funds have been used to pay one-third of the cost of the initial survey, and subsequent survey activities. On May 31, 1949, a total of $1,130,795 had been paid out to the States for survey and planning (see table 1). Eleven States and two Territories have utilized their allotments in full.

The State Plans

All of the States and Territories have now qualified for Federal aid for construction through submission of State plans which have been approved by the Surgeon General. The State plan contains an inventory of non-Federal hospital facilities in the State, and estimates of the total and additional facilities and beds needed. In the case of general hospitals the various areas of the State are rated according to priority of need. Each plan also contains evidence that the State administrative agency has authority to carry out the program, that it has appointed a suitable advisory council, and that the State has

Table 1. *Allotments and payments for survey and planning and 1948 and 1949 allotments for construction*

State or Territory	Survey and planning		Construction	
	Allotments	Payments (as of May 31, 1949)	Allotments 1948	Allotments 1949
Total	$1,800,000	$1,130,794.75	$75,000,000	$75,000,000
Alabama	36,300	15,000.00	2,885,880	2,690,543
Alaska	10,000	10,000.00	100,000	100,000
Arizona	10,000	10,000.00	451,739	443,109
Arkansas	22,935	18,753.00	1,966,582	1,966,552
California	108,240	84,160 00	1,956,160	2,121,367
Colorado	14,190	10,900.00	656,652	635,878
Connecticut	23,595	9,500.00	421,523	422,222
Delaware	10,000		100,000	100,000
District of Columbia	11,220		298,110	275,268
Florida	27,555	27,555.00	1,460,260	1,481,446
Georgia	40,095	27,518.00	2,976,228	2,791,307
Hawaii	10,000	10,000.00	222,758	261,868
Idaho	10,000	7,622 37	293,162	300,347
Illinois	100,650	73,662.50	2,768,690	2,764,357
Indiana	45,210	45,210.00	1,726,355	1,754,093
Iowa	29,865	20.462.00	1,340,446	1,393,932
Kansas	22,110	10,688.41	932,719	972,758
Kentucky	33,660	30,000.00	2,587,095	2,560,957
Louisiana	31,350	31,350 00	2,154,850	2,099,507
Maine	10,230	3,000.00	454,438	467,139
Maryland	26,895	16,127.45	869,663	827,301
Massachusetts	54,450	32,437.04	1,593,795	1,622,561
Michigan	72,435	30,043.00	2,169,996	2,174,668
Minnesota	33,165	22,697.00	1,653,926	1,725,122
Mississippi	26,565	26,565.00	2,401,451	2,270,043
Missouri	46,365	10,261 95	2,280,213	2,293,924
Montana	10,000	7,500.00	231,530	224,137
Nebraska	15,345	10,000.00	684,394	682,443
Nevada	10,000	10,000.00		100,000
New Hampshire	10,000	5,955.04	342,122	367,648
New Jersey	54 780	54,780.00	1,312,554	1,328,053
New Mexico	10,000	8,790.01	457,062	457,632
New York	164,670	130,247.08	2,941,663	3,029,743
North Carolina	44,385	35,381.18	3,429,016	3,413,486
North Dakota	10.000	10,000.00	308,157	287,845
Ohio	91,080	29,184.98	2,690,189	2,715,846
Oklahoma	25,905	13,500.00	1,639,006	1,730,437
Oregon	15,840	11,055.00	460,361	534,815
Pennsylvania	121,935	19,026.78	4,547,379	4,692,355
Puerto Rico	27,225	17,291.67	2,460,083	2,327,387
Rhode Island	10,000	2,000.00	279,966	267,856
South Carolina	23,925	23,925.00	1,974,755	1,923,581
South Dakota	10,000	5,596.00	359,217	353,873
Tennessee	37,785	25,872.00	2,671,070	2,616.055
Texas	84,480	11,988.56	4,836,567	4,865,137
Utah	10,000	5,340.74	364,840	354,023
Vermont	10,000	7,500.00	214,510	227,131
Virginia	37,455	17,342.99	2,208,159	2,114,928
Virgin Islands			32,765	29,271
Washington	26,070	26,070.00	511,646	553,979
West Virginia	22,935	22,935.00	1,554,281	1,529,058
Wisconsin	39,105	35,000.00	1,621,161	1,610,133
Wyoming	10,000	1,000.00	144,856	146,879

legislation authorizing standards of maintenance for hospitals to be built under the act.

In all except nine States, responsibility for administering the State program has been vested in the State Health Department. Each of the other nine States has set up a new agency for this purpose or has

utilized some other existing agency of the State government.[1]

Prior to the passage of the act, nine States[2] had legislation providing for the general licensure of hospitals. These States were able to meet, without additional legislation, the requirements that the State agency must have authority to set minimum standards for the operation of hospitals to be built under the program. Most of the remaining States and Territories, in order to meet this requirement, passed licensure laws applicable to all hospitals, not merely those eligible for government aid. Hence an incidental accomplishment of the program is the wide gain which has been made in the establishment and strengthening of licensure legislation for hospitals.

Planning for Hospitals and Health Centers

General Hospitals

The act sets forth limits beyond which the Federal Government will not aid in the construction of general hospitals. These limits are 4.5 beds per 1,000 population in States with 12 or more persons per square mile, 5.0 beds per 1,000 population in States with more than 6 or less than 12 persons per square mile, and 5.5 in States having 6 or less persons per square mile.

In planning for general hospitals, the States, in accordance with the regulations, have divided their areas into main hospital service regions with subordinate areas in each. The basic concept is that of a coordinated hospital system in which the various hospitals of the region would work together to better serve the public.

Three types of subordinate areas are designated—base intermediate, and rural. The base area must either contain a teaching hospital of a medical school or have a population of at least 100,000 and contain, on completion of the program, at least one general hospital of not less than 200 beds. This hospital must be approved for internships and for residencies in two or more specialties and must be suitable for use as a base hospital in a coördinated hospital system. It should have complete facilities for medical research, diagnosis and treatment and be capable of providing consultative services to the other general hospitals of the region. The intermediate area must have a population of at least 25,000 and contain, on completion of the hospital construction program, at least one general hospital of not less than 100 beds. This hospital should be capable of furnishing consultative services to the smaller hospitals in the surrounding rural areas. The rural area is any other area in the State not designated as a base or intermediate area.

[1] These States are Florida, Louisiana, Michigan, Mississippi, New Jersey, New York, North Carolina, Pennsylvania, and Vermont.

[2] These States are California, Connecticut, District of Columbia, Maine, Maryland, Massachusetts Minnesota, New York, and South Dakota.

With a coordinated hospital system, an appreciable number of patients from rural areas will go to hospitals in the intermediate and base areas, and some patients from intermediate areas will go to hospitals in a base area for care. Accordingly the States were instructed to estimate bed needs in the different areas on the basis of the following ratios of beds per 1,000 population, depending on population density in the State as a whole:

	Persons Per Square Mile		
Type of Area	*12.0 and over*	*6 1–11.9*	*6 0 and under*
Base	4. 5	5. 0	5 5
Intermediate	4. 0	4. 5	5. 0
Rural	2. 5	3 0	3. 5

These ratios determine the minimum allowances for each area. The difference between the total number of beds derived from the above area ratios and the number determined by the over-all State ratio forms a pool or reserve of beds which, at the discretion of the State agency, is distributed among the various areas on the basis of need.

Mental, Tuberculosis and Chronic Disease Hospitals

Planning for mental, tuberculosis and chronic disease hospitals is usually on a State-wide basis. The over-all State ratios beyond which the Federal Government will not provide aid for construction are the following: (a) for tuberculosis patients, 2.5 beds per average annual death from tuberculosis in the State during the 5-year period 1940–1944; (b) for mental patients, 5 beds per 1,000 population; (c) for chronic disease patients, 2 beds per 1,000 population.

The State plans indicate that the States are giving considerable emphasis to construction of mental and tuberculosis beds as units of, or in conjunction with, general hospitals. As regards beds for chronic disease, many of the State agencies indicate that further study of the problem will be necessary before it will be possible to develop a sound program.

Public Health Centers and Related Facilities

A public health center is defined as a publicly owned facility for providing public health services, the scope of which is a matter of State law. For purposes of Federal aid, the number of public health centers and the general distribution of such centers throughout the State may not exceed one per 30,000 population, or, in States having less than 12 persons per square mile, one per 20,000 population. No limit is placed upon the number of "related facilities" which may be constructed. These include laboratories, clinics, health department headquarters, etc.

Table 2. *General beds: existing beds, net additional and total beds needed as reported in official State plans for hospital construction*

As of Dec. 31, 1948

State	Existing beds: Total	Existing beds: Acceptable: Number	Existing beds: Acceptable: Per 1,000 population	Additional beds needed	Total beds needed
Total United States and Territories [1]	474,532	397,168	2.8	255,443	652,611
Total United States [1]	464,486	390,412	2.8	250,043	640,455
Alabama	6,573	4,886	1.8	7,391	12,277
Arizona	2,831	2,557	3.9	1,070	3,627
Arkansas	4,445	3,290	1.8	5,194	8,484
California	32,810	27,858	2.9	16,378	44,236
Colorado	4,860	4,093	3.9	1,459	5,552
Connecticut	6,774	6,590	3.8	2,616	9,206
Delaware	1,173	1,161	4.0	253	1,414
District of Columbia	4,112	2,111	2.6	1,557	3,668
Florida	6,762	6,570	2.9	3,553	10,123
Georgia	7,337	6,883	2.2	7,015	13,898
Idaho	1,619	1,155	2.4	1,443	2,598
Illinois	27,952	22,955	3.0	11,707	34,662
Indiana	9,714	7,203	2.1	8,130	15,333
Iowa	9,119	6,689	2.6	4,831	11,520
Kansas	5,741	5,109	2.8	3,163	8,272
Kentucky	6,220	5,745	2.3	6,043	11,788
Louisiana	8,495	7,110	2.9	4,669	11,779
Maine	3,035	1,656	1.9	2,277	3,933
Maryland	6,736	6,515	3.3	2,639	9,154
Massachusetts	19,341	17,906	3.9	5,981	23,887
Michigan	18,119	14,011	2.3	13,769	27,780
Minnesota	11,403	9,165	3.3	4,863	14,028
Mississippi	4,835	3,345	1.7	5,632	8,977
Missouri	14,319	13,342	3.5	4,934	18,276
Montana	2,893	2,316	4.7	727	3,043
Nebraska	5,457	4,086	3.2	2,426	6,512
New Hampshire	2,204	1,928	3.9	446	2,374
New Jersey	16,675	16,650	3.9	3,970	20,620
New Mexico	1,356	1,210	2.3	1,800	3,010
New York	56,942	43,965	3.2	18,751	62,716
North Carolina	9,798	8,003	2.2	9,488	17,491
North Dakota	2,376	2,286	4.4	1,141	3,427
Ohio	21,635	19,110	2.5	14,682	33,792
Oklahoma	7,389	6,978	3.4	2,899	9,877
Oregon	4,453	3,886	2.7	2,733	6,619
Pennsylvania	35,375	27,268	2.7	17,751	45,019
Rhode Island	1,981	1,851	2.5	1,459	3,310
South Carolina	4,785	4,244	2.3	4,384	8,628
South Dakota	2,618	2,173	4.0	978	3,151
Tennessee	6,890	6,715	2.4	6,346	13,061
Texas	18,678	17,158	2.4	14,778	31,936
Utah	2,251	2,004	3.4	955	2,959
Vermont	1,261	868	2.4	770	1,638
Virginia	7,594	6,813	2.4	5,932	12,745
Washington	7,890	7,398	3.8	1,768	9,166
West Virginia	6,329	4,671	2.7	3,308	7,979
Wisconsin	12,243	10,026	3.2	5,374	15,400
Wyoming	1,088	900	3.3	610	1,510
Total Territories	10,046	6,756	2.5	5,400	12,156
Alaska	449	127	1.4	362	489
Hawaii	2,547	784	1.5	1,573	2,357
Puerto Rico	6,753	5,845	2.9	3,329	9,174
Virgin Islands	297	------------	------------	136	136

[1] Excludes Nevada, since the State plan was not submitted in time for inclusion in this report.

Existing Facilities and Needs Shown by State Plans

As of December 31, 1948, the plans of the 52 States and Territories, Nevada excepted,[3] show a total of 1,024,286 existing hospital beds (Federal hospitals excluded). Of these 879,377 are considered by the State and Territorial agencies to be acceptable, the remaining 144,909 being classified as nonacceptable. Unsound buildings, health menaces and fire hazards constitute some of the reasons for nonacceptability. All told an additional 898,132 beds are needed. The Nation now has 468 health centers and 722 auxiliary public health facilities. An additional 1,853 health centers and 1,386 auxiliary facilities are estimated to be needed.

General Hospitals

The 52 State plans reported a total of 474,532 beds in general hospitals. As indicated in table 2, 77,364 of these beds have been declared nonacceptable by the State agencies. This makes a total of 397,168 existing acceptable beds, or 2.8 beds per 1,000 population. An additional 255,443 general beds are needed.

The 52 State plans show that the ratio of existing acceptable beds per 1,000 population varies from zero in the Virgin Islands to 4.7 in Montana. Montana, with less than 12 persons per square mile, may receive Federal aid in construction costs up to 5.0 beds per 1,000 population. No State has enough acceptable beds to meet the established standards.

The plans show for the first time how many people presently live in areas which in the judgment of a responsible agency should have hospital facilities, but which are now without such facilities. Of the 2,323 general hospital service areas, outlined in the various State plans, 594 or 25.6 percent have no existing acceptable beds. There are 9,952,000 people, constituting 7.1 percent of the total population, living in these areas (table 3).

Mental Hospitals

A total of 428,931 existing mental beds (excluding beds in institutions for epileptics and mental defectives) is reported. Of these, 47,304 have been declared nonacceptable (see table 4). This leaves a total of 381,627 existing acceptable beds, or 2.7 beds per 1,000 population. On the basis of the ratio of 5 beds per 1,000 population, 310,523 additional mental beds are needed.

Tuberculosis Hospitals

At present, there are 85,466 existing tuberculosis beds reported in the State plans (see table 5). Of these 72,560 are classified as accept-

[3] The State plan for Nevada was not submitted for approval until May 1949. Consequently, the data on existing and additionally needed facilities were not available in time for inclusion in this report.

Table 3. *Distribution of general hospital service areas by type, population, existing acceptable beds, additional and total needed* [1]

United States and Territories [2] as of Dec. 31, 1948

Type of area	Number of areas	Population		Number of beds					
		Number (thousands)	Average	Existing acceptable		Additional needed		Total needs	
				Total	Per 1,000 pop.	Total	Per 1,000 pop.	Total	Per 1,000 pop.
Total areas	2,323	139,702	60,139	397,168	2.9	255,443	1.8	652,611	4.7
Base	104	55,681	535,394	210,455	3.8	88,207	1.6	298,662	5.4
Intermediate	647	47,681	73,696	130,506	2.7	94,936	2.0	225,442	4.7
Rural	1,572	36,263	23,068	56,106	1.5	71,088	2.0	127,194	3.5
Unassigned	-------	77	-------	101	------	1,212	-------	1,313	------
Total areas with existing acceptable beds	1,729	129,673.	74,999	397,067	3.1	220,426	1.7	617,493	4.8
Base	104	55,681	535,394	210,455	3.8	88,207	1.6	298,662	5.4
Intermediate	613	46,518	75,886	130,506	2.8	90,006	1.9	220,512	4.7
Rural	1,012	27,474	27,148	56,106	2.1	42,213	1.5	98,319	3.6
Total areas with no existing acceptable beds	594	9,952	16,754	-------	------	33,805	3.4	33,805	3.4
Base	-------	-------	-------	-------	------	-------	-------	-------	------
Intermediate	34	1,163	34,206	-------	------	4,930	4.2	4,930	4.2
Rural	560	8,789	15,695	-------	------	28,875	3.3	28,875	3.3
Unassigned	-------	77	-------	101	------	1,212	-------	1,313	------

[1] As shown in 52 State plans for hospital construction as of Dec. 31, 1948, P. L. 725, 79th Cong., Hospital Survey and Construction Act.
[2] Excludes Nevada since the State plan was not submitted in time for inclusion in this report.

able. On the basis of the prescribed ratio of 2.5 beds per average annual death from tuberculosis, the need is estimated at 82,541 additional beds. The country as a whole has 1.17 beds per average annual death from tuberculosis, or less than half of the estimated need.

Chronic Disease Hospitals

There are relatively few chronic disease hospitals. As shown in table 6, a total of 36,250 chronic disease beds is reported. Of this number, 28,517 beds are considered acceptable. On the basis of the ratio of 2.0 beds per 1,000 population, a need exists for 248,294 additional beds of this type. The Nation thus has only 10 percent of the total needed.

Project Construction Schedule

After approval of the State plan, the State agency is required to develop a project construction schedule which sets the annual construction goal for the State.

For inclusion on the schedule, projects are selected according to the relative need for the facility and according to the priority system outlined in the State plan.

An annual schedule is required, but amendments may be made at any time to add projects if the entire State allotment has not been used, or to drop those projects failing to meet requirements of the act and regulations.

Table 4. *Mental Beds*[1]*: existing beds, net additional and total beds needed as reported in official State plans for hospital construction*

As of Dec. 31, 1948

State	Existing beds: Total	Acceptable: Number	Acceptable: Per 1,000 population	Additional beds needed	Total beds needed
Total United States and Territories[2]	428,931	381,627	2.7	310,523	[3] 691,958
Total United States[2]	426,773	379,620	2.8	299,145	[3] 678,573
Alabama	5,729	5,729	2.1	7,912	13,641
Arizona	1,250	1,250	1.9	1,995	3,245
Arkansas	4,796	2,206	1.2	7,181	9,387
California	29,408	28,310	2.9	13,386	41,696
Colorado	5,268	5,204	4.9	96	5,300
Connecticut	7,280	7,280	3.6	2,800	10,080
Delaware	1,254	1,154	3.9	311	1,465
District of Columbia	5,161	2,567	3.1	1,509	4,076
Florida	5,842	5,842	2.6	5,401	11,243
Georgia	9,351	9,351	3.0	6,089	15,440
Idaho	721	721	1.5	1,640	2,361
Illinois	22,289	13,351	1.8	24,390	37,741
Indiana	8,386	8,264	2.4	8,673	16,937
Iowa	6,086	3,113	1.2	9,582	12,695
Kansas	4,786	4,786	2.7	4,179	8,965
Kentucky	7,135	7,052	2.8	5,551	12,603
Louisiana	6,796	4,620	1.9	7,723	12,343
Maine	3,856	3,856	4.4	514	4,370
Maryland	7,453	7,278	3.7	2,812	10,090
Massachusetts	21,123	21,102	4.6	1,738	22,840
Michigan	15,171	7,522	1.2	22,728	30,250
Minnesota	7,644	7,185	2.5	6,905	14,090
Mississippi	4,408	4,408	2.2	5,542	9,950
Missouri	11,885	11,885	3.1	6,995	18,880
Montana	1,800	1,800	3.7	584	2,384
Nebraska	6,210	6,210	4.9	168	6,378
New Hampshire	1,985	1,985	4.0	580	2,565
New Jersey	14,145	14,145	3.4	6,940	21,085
New Mexico	1,018	1,018	1.9	1,658	2,676
New York	64,511	64,511	4.7	4,728	69,239
North Carolina	10,123	9,446	2.6	8,417	17,863
North Dakota	2,160	2,160	4.2	438	2,598
Ohio	18,428	16,239	2.2	21,256	37,495
Oklahoma	5,932	5,932	2.9	4,240	10,172
Oregon	4,299	4,299	3.0	2,964	7,263
Pennsylvania	29,555	28,818	2.9	21,203	50,021
Rhode Island	3,282	3,282	4.5	395	3,677
South Carolina	3,414	3,414	1.8	6,001	9,415
South Dakota	1,888	1,888	3.5	836	2,724
Tennessee	6,808	6,808	2.4	7,354	14,162
Texas	13,631	13,631	1.9	21,166	34,797
Utah	1,120	1,120	1.9	1,839	2,959
Vermont	2,012	2,012	5.5	----------	[3] 1,820
Virginia	9,234	3,848	1.4	10,202	14,050
Washington	5,077	4,341	2.2	5,428	9,769
West Virginia	3,252	2,201	1.3	6,384	8,585
Wisconsin	13,105	5,770	1.8	10,043	15,813
Wyoming	706	706	2.6	669	1,375
Total Territories	**2,158**	**2,007**	**0.7**	**11,378**	**13,385**
Alaska	----------	----------	----------	438	438
Hawaii	809	689	1.3	1,931	2,620
Puerto Rico	1,318	1,318	0.6	8,875	10,193
Virgin Islands	31	----------	----------	134	134

[1] Excludes beds in institutions for the feeble-minded and epileptics.
[2] Excludes Nevada.
[3] Total beds needed does not equal the sum of existing acceptable beds plus net additional needed in Vermont, where existing beds exceed the number allowable on the basis of the State ratio.

Table 5. *Tuberculosis Beds: existing beds, net additional and total beds needed as reported in official State plans for hospital construction*

As of Dec. 31, 1948

State	Existing beds			Additional beds needed	Total beds needed
	Total	Acceptable			
		Number	Per death		
Total United States and Territories [1]	85,466	72,560	1.17	82,541	[2] 154,836
Total United States [1]	82,005	69,751	1.23	72,119	[2] 141,605
Alabama	579	519	.38	2,939	3,458
Arizona	559	559	.90	995	1,554
Arkansas	1,351	1,351	1.45	979	2,330
California	6,784	2,231	.58	7,367	9,598
Colorado	1,270	1,050	2.63	654	1,704
Connecticut	1,721	1,721	2.88	------------	[2] 1,492
Delaware	193	193	1.53	122	315
District of Columbia	1,177	1,052	1.76	439	1,491
Florida	1,018	515	.59	1,665	2,180
Georgia	1,288	1,288	.98	2,009	3,297
Idaho	55	55	.58	182	237
Illinois	4,570	4,570	1.48	3,138	7,708
Indiana	1,779	1,136	.93	1,917	3,053
Iowa	791	672	1.71	308	980
Kansas	458	458	1.13	552	1,010
Kentucky	1,607	1,564	.85	3,011	4,575
Louisiana	1,286	1,254	.96	2,021	3,275
Maine	526	526	1.78	211	737
Maryland	1,883	1,743	1.37	1,434	3,177
Massachusetts	3,673	3,604	2.04	804	4,408
Michigan	4,645	3,811	2.15	615	4,426
Minnesota	1,924	1,859	2.53	------------	[2] 1,838
Mississippi	541	458	.47	1,975	2,433
Missouri	1,805	1,805	1.10	2,282	4,087
Montana	235	235	1.18	262	497
Nebraska	200	200	1.00	303	503
New Hampshire	189	189	1.52	121	310
New Jersey	3,359	3,359	1.81	231	3,590
New Mexico	284	284	.76	653	937
New York	11,594	11,594	1.90	3,636	15,230
North Carolina	2,014	1,830	1.31	1,660	3,490
North Dakota	275	275	2.64	------------	[2] 260
Ohio	3,298	2,785	.98	4,318	7,103
Oklahoma	1,186	1,186	1.19	1,305	2,491
Oregon	576	492	1.68	240	732
Pennsylvania	5,647	3,609	.87	6,731	10,340
Rhode Island	629	629	2.21	84	713
South Carolina	903	903	1.15	1,052	1,955
South Dakota	192	192	1.06	261	453
Tennessee	1,142	1,142	.54	4,100	5,242
Texas	2,124	2,103	.60	6,597	8,700
Utah	96	96	1.45	69	165
Vermont	147	147	1.23	153	300
Virginia	1,511	920	.62	2,817	3,737
Washington	1,317	833	1.42	633	1,466
West Virginia	1,321	1,021	1.27	995	2,016
Wisconsin	2,201	1,651	2.17	251	1,902
Wyoming	82	82	1.86	28	110
Total Territories	3,461	2,809	.53	10,422	13,231
Alaska	137	116	.31	816	932
Hawaii	1,048	439	1.66	222	661
Puerto Rico	2,254	2,254	.49	9,339	11,593
Virgin Islands	22	------------	------------	45	45

[1] Excludes Nevada.
[2] Total beds needed does not equal the sum of existing acceptable plus additional needed in Connecticut, Minnesota, and North Dakota, where existing beds exceed the number allowable on the basis of the State ratio.

Table 6. *Chronic Beds [1]: existing beds, net additional and total beds needed as reported in official State plans for hospital construction*

As of Dec. 31, 1948

State	Existing beds: Total	Existing beds: Acceptable: Number	Existing beds: Acceptable: Per 1,000 population	Additional beds needed	Total beds needed
Total United States and Territories [2]	36,250	28,517	0.20	248,294	[3] 276,782
Total United States [2]	36,032	28,413	0.21	243,044	[3] 271,428
Alabama				5,456	5,456
Arizona	108	44	.07	1,254	1,298
Arkansas				3,755	3,755
California	5,282	3,434	.36	13,244	16,678
Colorado	31	31	.03	2,089	2,120
Connecticut	465	465		3,567	4,032
Delaware	236	236	.81	350	586
District of Columbia	315	170	.21	1,460	1,630
Florida	493	450	.20	4,047	4,497
Georgia	1,085	1,085	.35	5,091	6,176
Idaho	163	163	.35	782	945
Illinois	388	388	.05	14,708	15,096
Indiana	79	79	.02	6,696	6,775
Iowa				5,078	5,078
Kansas				3,586	3,586
Kentucky	223			5,041	5,041
Louisiana				4,937	4,937
Maine	170	170	.19	1,578	1,748
Maryland	2,521	1,713	.86	2,323	4,036
Massachusetts	1,100	1,100	.24	8,036	9,136
Michigan	992	872	.14	11,228	12,100
Minnesota	398	209	.07	5,427	5,636
Mississippi	137	125	.06	3,855	3,980
Missouri	1,081	1,081	.29	6,471	7,552
Montana				954	954
Nebraska				2,551	2,551
New Hampshire	198	198	.40	828	1,026
New Jersey	2,302	2,302	.55	6,132	8,434
New Mexico	40	40	.07	1,030	1,070
New York	5,165	5,165	.37	22,531	27,696
North Carolina	160	160	.04	6,985	7,145
North Dakota	108	108	.21	931	1,039
Ohio	609			14,998	14,998
Oklahoma				4,069	4,069
Oregon				2,905	2,905
Pennsylvania	1,242	896	.09	19,112	20,008
Rhode Island	1,192	1,192	1.62	279	1,471
South Carolina	60	60	.03	3,706	3,766
South Dakota				1,089	1,089
Tennessee	247	247	.09	5,418	5,665
Texas	1,971	1,869	.27	12,050	13,919
Utah				1,184	1,184
Vermont				728	728
Virginia				5,620	5,620
Washington	5,619	3,937	2.02		[3] 3,908
West Virginia				3,434	3,434
Wisconsin	1,852	424	.13	5,901	6,325
Wyoming				550	550
Total Territories	218	104	.04	5,250	5,354
Alaska	44	44	.50	131	175
Hawaii	114			1,048	1,048
Puerto Rico	60	60	.03	4,018	4,078
Virgin Islands				53	53

[1] Excludes beds in institutions devoted primarily to domiciliary care.
[2] Excludes Nevada.
[3] Total beds needed does not equal the sum of existing acceptable plus additional needed in Washington, where existing beds exceed the number allowable on the basis of the State ratio.

Table 7. *Existing and programmed health center and auxiliary facilities reported in official State plans for hospital construction*

As of Dec. 31, 1948

State	Health centers		Auxiliary facilities	
	Existing	Programmed	Existing	Programmed
Total United States and Territories [1]	479	1,836	723	1,386
Total United States [1]	437	1,783	696	1,371
Alabama	34	33	2	10
Arizona	3	6	1	15
Arkansas	5	72		
California	33	127	55	66
Colorado	2	14		32
Connecticut	31	31		
Delaware		5		
District of Columbia	1	5		
Florida	3	36	10	148
Georgia	12	45	12	110
Idaho	2	4		17
Illinois	1	252		
Indiana	1	36		
Iowa	1	26		
Kansas	16	33		
Kentucky	8	14	85	16
Louisiana		49		52
Maine		25		
Maryland	18	15	113	1
Massachusetts	11	30	1	1
Michigan	45	34	17	
Minnesota	1	10		2
Mississippi	31	35	15	159
Missouri	11	30		
Montana	1	12		1
Nebraska	2	21	4	2
New Hampshire				
New Jersey		42		
New Mexico	9	1	13	19
New York	30	158	288	
North Carolina	12	89		14
North Dakota	2	6		
Ohio		37		58
Oklahoma	7	61	2	16
Oregon	12	6	3	4
Pennsylvania	22	24		
Rhode Island	7			
South Carolina	8	38	5	231
South Dakota		11		
Tennessee	12	62	34	77
Texas	14	66	9	141
Utah	2	14	1	1
Vermont		5		13
Virginia	15	63	3	10
Washington	7	13	13	41
West Virginia	3	19		60
Wisconsin	1	43	1	44
Wyoming	1	5		4
Total Territories	42	53	27	15
Alaska	15		2	
Hawaii	3	8	22	11
Puerto Rico	24	44	3	
Virgin Islands		1		4

[1] Excludes Nevada.

Project Application

The application is divided into four parts for the convenience of the applicant. The initial part (part I) is planned to provide sufficient information for tentative approval by the State agency and the Sur-

geon General. The second part of the application shows the financial resources which are or will be available. The third part gives information from a site survey and soil investigation, and on title to the site.

The fourth and final part of the application includes the final cost estimates and the working drawings and specifications. Then a contract document is executed between the applicant, the State agency and the Federal Public Health Service.

Approval by the State Agency. Before the State agency can recommend approval, certain assurances must be obtained from the applicant among which are: (1) that the facility will provide service without discrimination as to race, creed, or color, and will furnish a reasonable volume of free patient care (in areas where separate facilities are provided for separate population groups, the nondiscrimination requirement may be met through the planning of facilities which will make equitable provision for these groups); (2) that the facility, when completed, will be operated and maintained according to minimum standards set by the State; (3) that the construction contract will prescribe the minimum rates of pay for laborers and mechanics, as established by the Secretary of Labor; (4) that actual construction work will be performed by the lump sum (fixed price) contract method, and that adequate methods of obtaining competitive bidding will be used; (5) that adequate engineering or architectural supervision and inspection of the project will be provided to assure conformance with approved plans and specifications.

Approval by the Surgeon General. The Surgeon General must approve any application recommended by the State agency if he finds that it complies with the approved State plan and with the regulations, and contains the assurances indicated above, and if funds to cover one-third of the construction costs are available from the State's allotment. If, after giving an opportunity for a hearing, the Surgeon General disapproves an application or withholds funds for failure to comply with legal requirements, an appeal may be taken to the U. S. Circuit Court of Appeals by the State agency.

Construction Progress

A year and ten months have passed since the first construction allotment was made available to the States. (No funds were appropriated for the first year of the program since it was believed—and later borne out—that a year would be required for the State surveys and for developing State plans.) Over this period, the number of approved construction applications has steadily and rapidly increased. In September 1947, the first project applications received initial (part I) approval by the Surgeon General. Within the next 6 months—by April 30, 1948—the number of initially approved applications had increased to a total of 249 with total construction costs estimated at

$123,000,000. A year and a month later—by May 31, 1949—a total of 792 project applications had received initial approval (see table 8). These projects will have a total cost of $483,400,000, of which the Federal share will amount to $149,000,000 (see fig. 1). The final

Table 8. *Number of approved project applications, number of beds provided, total estimated construction costs, and Federal share, by State*

As of May 31, 1949

State	Number of projects	Number of beds	Construction costs	
			Total	Federal share
Totals	792	38,130	$483,403,883	$149,006,637
Alabama	21	1,425	20,119,509	6,539,504
Arizona	5	265	3,126,804	726,340
Arkansas	21	1,168	9,831,737	3,261,135
California	21	711	12,471,147	3,951,798
Colorado	7	377	6,554,298	1,740,561
Connecticut	6	211	2,617,680	835,560
Delaware	1	40	607,061	202,353
District of Columbia	------	------	------	------
Florida	17	1,303	14,894,189	4,734,584
Georgia	34	964	12,552,381	4,160,208
Idaho	5	203	2,428,791	677,388
Illinois	13	854	14,588,564	4,681,799
Indiana	22	986	14,743,139	4,723,336
Iowa	17	564	7,709,706	2,224,570
Kansas	17	505	6,413,431	1,982,764
Kentucky	25	1,036	12,209,582	4,042,184
Louisiana	24	1,204	14,073,652	4,356,545
Maine	5	214	2,278,509	744,940
Maryland	5	327	4,724,171	1,488,777
Massachusetts	13	560	9,957,089	2,964,419
Michigan	15	1,007	15,532,228	5,149,809
Minnesota	18	764	11,463,483	3,462,134
Mississippi	68	1,968	21,679,269	7,036,101
Missouri	10	697	12,119,094	3,816,907
Montana	6	128	1,298,107	420,712
Nebraska	16	337	5,118,331	1,104,630
Nevada	1	21	230,252	6,885
New Hampshire	4	115	2,042,200	679,286
New Jersey	9	966	12,687,449	3,089,844
New Mexico	8	432	4,730,836	959,341
New York	38	1,955	28,891,255	8,192,869
North Carolina	35	2,272	23,684,606	7,476,449
North Dakota	6	116	1,403,680	466,957
Ohio	21	1,219	18,164,416	5,266,663
Oklahoma	32	864	9,213,870	3,027,852
Oregon	5	151	2,028,480	671,584
Pennsylvania	21	1,720	24,890,581	8,029,143
Rhode Island	5	230	3,114,500	971,333
South Carolina	50	920	9,404,138	3,078,050
South Dakota	7	191	1,679,468	549,765
Tennessee	22	1,393	16,974,531	5,496,874
Texas	55	3,097	31,135,234	8,882,336
Utah	6	179	1,991,255	656,082
Vermont	4	165	2,232,173	668,487
Virginia	17	694	12,489,520	3,958,781
Washington	10	244	3,303,136	1,126,373
West Virginia	3	341	7,140,775	2,375,257
Wisconsin	10	638	8,102,975	2,620,929
Wyoming	2	52	576,723	192,240
Alaska	1	34	599,076	199,692
Hawaii	1	216	2,472,525	383,720
Puerto Rico	6	2,087	15,008,177	4,927,057
Virgin Islands	1	------	11,100	3,700

stage of the application (part IV) has been approved for 387 projects. (On the average, there has been an 8-month lag between submission for approval of the first part and the final part of the application.) The value of these 387 projects now under contract is $220,000,000, involving $67,600,000 of Federal funds.

Among the ten Federal Security regions, the largest number of applications, by far, has come from region VI, comprised of Alabama, Florida, Georgia, Mississippi, South Carolina, Tennessee, and Puerto Rico and the Virgin Islands.

In terms of total construction costs of all projects, the major share, as could be expected, is for the 219 projects in this region. One-fourth of the total costs of all approved projects is accounted for by projects in this southern region—nearly $111 million. Of the 38,130 beds in all approved projects, 10,060, or 26 percent, are in this region. Mississippi led in the number of projects initially approved by the end of May 1949. As of that date, a total of 68 Mississippi projects had been initially approved by the Surgeon General. In terms of construction costs, however, and in number of beds to be provided, Texas, in region VIII, stood in first place.

Type of Project. Of the 792 projects initially approved as of May 31, 1949, 606 are general hospitals with 29,755 beds; 40 are mental hospitals with 4,543 beds; 28 are tuberculosis hospitals with 2,809 beds; 12 are chronic disease hospitals with 1,023 beds; and 106 are public health centers (see table 9). The total number of beds of all types number 38,130. As shown by these figures, the States have centered their efforts, until now, on the construction of general hospital projects. About four-fifths of all approved projects, beds to be constructed, and total construction costs are accounted for by general hospital projects.

General Hospital Projects

Among the various States and Territories, all but the District of Columbia and Hawaii have now submitted and received approval for one or more general hospital projects. Three out of every five (a total of 367) of the general hospital project applications are for completely new facilities; the remaining two out of five are for additions or alterations to existing hospitals.

Sponsorship. A slightly higher proportion of approved general hospital projects are sponsored by public agencies rather than by private nonprofit organizations. As of the end of May, 56 percent of all general hospital project applications were for publicly owned facilities.

Inasmuch as nonprofit general hospitals for which applications have been approved tend to be somewhat larger than those sponsored by government, the total beds to be constructed are about evenly divided between nonprofit and governmental facilities. In terms of construc-

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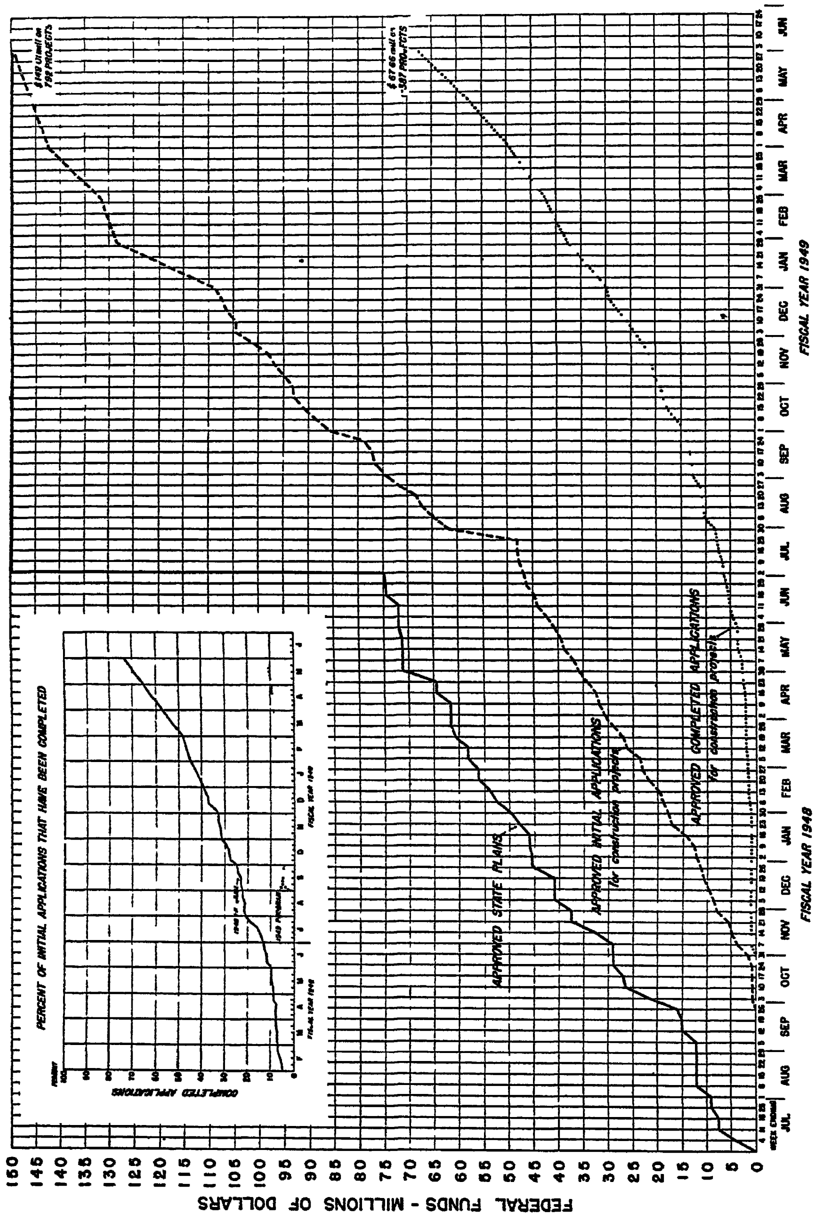


Figure 1. Current status of the Hospital Survey and Construction Act.

tion costs, nonprofit facilities account for slightly more than half of the estimated costs of all general hospital projects—55 percent of the total going for nonprofit institutions compared with 45 percent for public facilities.

Among the various regions of the country there is wide variation in type of ownership of the approved general hospital projects. In New England (region I) for example, 97 percent of the approved project applications have been submitted by nonprofit organizations. In the Southeast, (region VI) only 24 percent have been for facilities under nonprofit sponsorship.

Size of hospital. Most general hospital projects approved by the end of May 1949, were relatively small in terms of bed capacity. The 367 new general hospital projects average about 49 beds. Only one in every eight new general hospitals has more than 100 beds, as the following tabulation shows:

Size of hospital	*New general hospital projects*	
	Number	*Percent distribution*
Total	367	100. 0
Under 25 beds	82	22. 4
25–49 beds	138	37. 6
50–74 beds	76	20. 7
75–99 beds	13	3. 5
100 beds and over	47	12. 8
Unknown [1]	11	3. 0

[1] Represents new projects for which funds for equipment only are provided; the number of beds in these facilities was not reported.

Size of community. Seven out of ten of the 367 new general hospital projects are located in towns with less than 5,000 population. Only 19 projects are located in cities of 25,000 or more, as the following figures show:

Size of community	*New general hospital projects*	
	Number	*Percent distribution*
Total	367	100. 0
Under 2,500	157	42. 8
2,500–4,999	92	25. 0
5,000–9,999	65	17. 7
10,000–24,999	34	9. 3
25,000–49,999	4	1. 1
50,000 and over	15	4. 1

In only 12 States are more than half of the new general hospital projects located in cities of 5,000 or more; even in these States, the projects are generally located in cities of less than 25,000 population.

Table 9. *Distribution of approved project applications, beds provided, and construction costs, by type of facility*

As of May 31, 1949

Type of facility	Projects		Construction costs				Beds	
	Number	Percent	Total	Percent	Federal share	Percent	Number	Percent
Total	792	100.0	$483,403,883	100.0	$149,006,637	100.0	38,130	100.0
General	606	76.5	394,746,290	81.7	123,200,334	82.7	29,755	78.0
Mental	40	5.1	34,423,298	7.1	10,999,160	7.1	4,543	11.9
Tuberculosis	28	3.5	27,388,267	5.7	8,302,930	5.6	2,809	7.4
Chronic	12	1.5	16,120,539	3.3	2,960,588	2.0	1,023	2.7
Public Health Centers	106	13.4	10,725,489	2.2	3,543,625	2.3	------	------

Funds Obligated

By May 31, 1949, all of the 1948 allotment of $75 million had been committed through initial approval of construction applications. A total of $55.5 million has been encumbered by final approval and payments amounting to $7.2 million have been made from 1948 funds.

Amounts committed from 1949 funds total $57.8 million; approximately $9.9 million have been encumbered by final approval. Payments from 1949 funds total nearly $814,000.

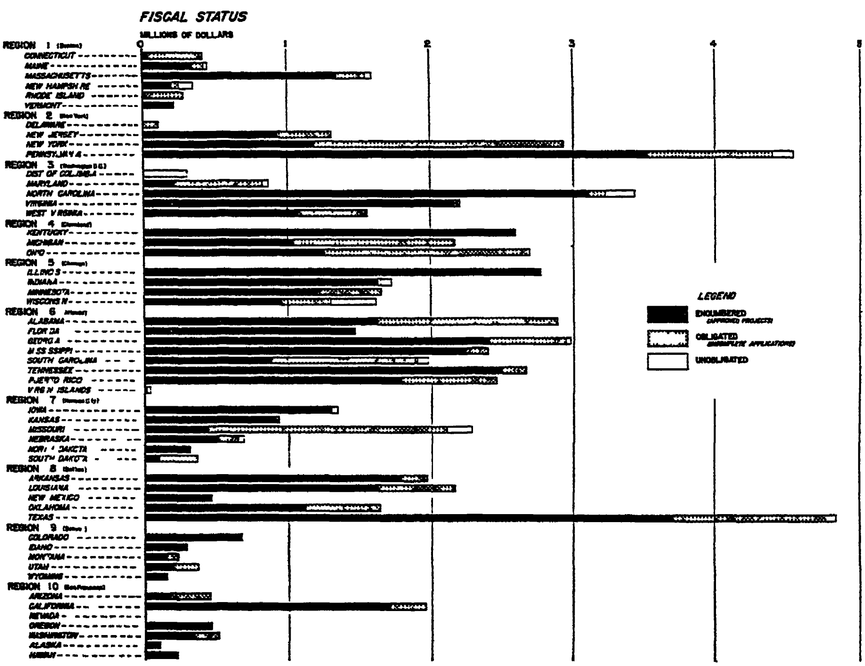


Figure 2. Status of 1948 program. Federal grants-in-aid for hospital construction under P. L. 725, May 31, 1949.

Thus far, only $13 million have been committed from the 1950 allotment and only $1.6 million have been encumbered by final approval.

There are wide variations in the extent to which construction allotments have been committed, as shown in figures 2 and 3.

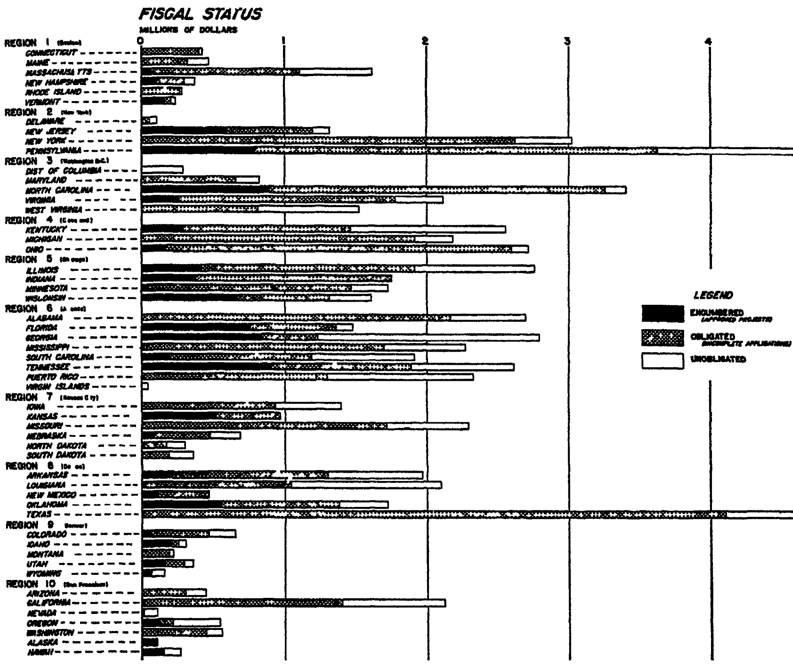


Figure 3. Status of 1949 program. Federal grants-in-aid for hospital construction under P. L. 725, May 31, 1949.

Conclusion and Summary

The National Hospital Program is now well under way. All of the States and Territories have surveyed and appraised their existing hospitals and health center facilities, have determined their needs for additional facilities, and have developed programs for constructing facilities to meet these needs. All have passed the necessary legislation to enable them to participate and have had State plans approved by the Surgeon General. Within the Federal Government and in all of the 53 States and Territories, organizations have been established and are in operation.

As of May 31, 1949, 792 applications for construction projects have received initial or final approval. The total cost of construction of these projects will amount to $483,400,000 of which the Federal share will be $149,000,000.

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1947–June 1949

Prior to World War II, communities which achieved a compliance rating of 90 percent or more under the milk ordinance recommended by the Public Health Service were listed semiannually in PUBLIC HEALTH REPORTS. Owing to the war time deterioration in milk quality resulting from labor and equipment shortages, as well as from reduction in local milk control staffs, publication of these lists was suspended after the issue of February 19, 1943. At the request of health departments which have succeeded in restoring the quality of their milk supplies, publication of these lists, though much smaller than formerly, was resumed in PUBLIC HEALTH REPORTS February 25, 1949.

Listed in the table are all Public Health Service milk ordinance communities which were reported by State milk-sanitation authorities during July 1, 1947 to June 30, 1949, as having a market milk rating of at least 90 percent. The inclusion of a community in this list means that if pasteurized milk is sold in the community, it is of such a degree of excellence that the weighted average of the percentages of compliance with the various items of sanitation required by the Public Health Service Milk Ordinance for grade A pasteurized milk is 90 percent or more, and that, similarly, if raw milk is sold in the community, it so nearly meets the standards that the weighted average of the percentages of compliance with the various items of sanitation required for grade A raw milk is 90 percent or more.

These ratings are not a complete measure of safety, but represent the degree of compliance with the grade A standards. High-grade pasteurized milk is safer than high-grade raw milk, because of the added protection of pasteurization. Safety estimates should take into account the percentage of milk pasteurized, which is given in the table. To obtain this added protection, those who are dependent on raw milk can pasteurize the milk at home in the following simple manner: Heat the milk over a hot flame to 165° F., stirring constantly, then immediately place the vessel in cold water and continue stirring until cool, changing the water when it warms up. However, if a dependable thermometer is not available, bring the milk to a boil instead.

The milk ordinance recommended by the Public Health Service is now in effect statewide in 10 States, as well as in 207 counties and 1,207 municipalities located in 39 States. It has been adopted as a regulation by 31 States and Territories.

The primary reason for publishing the rating lists is to encourage these communities to attain and maintain a high level of excellence

From Division of Sanitation, Milk and Food Branch.

in the enforcement of the ordinance. No comparison with communities operating under other milk ordinances is intended or implied. Some communities which have high-grade milk supplies are not included because arrangements have not been made for the determination of their ratings by the State milk sanitation authority. In other cases the ratings which have been submitted are now more than 2 years old and have therefore lapsed. In still other communities with high-grade milk supplies there seems, in the opinion of the community, to be no local necessity nor desire for rating or inclusion in the list.

The rules under which a community is included in this list are:

1. All ratings must be determined by the State milk-sanitation authority in accordance with the Public Health Service rating method [1] based upon the grade A pasteurized milk and the grade A raw milk requirements of the Public Health Service Milk Ordinance and Code. A recent departure from the method described consists of computing the pasteurized milk rating by weighting the plant rating twice as much as the rating of the raw milk for pasteurization.

2. No community will be included in the list unless both its pasteurized milk and its raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the raw milk ratings are 90 percent or more.

3. The rating used will be the latest rating submitted to the Public Health Service, but no rating will be used which is more than 2 years old. To promote continuous rigid enforcement rather than occasional "clean-up campaigns" it is suggested that when the rating of a community on the list falls below 90 percent no resurvey be made for at least 6 months, resulting in removal from the next semiannual list.

4. The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. If such check rating is less than 90 percent but not less than 85, the city will be removed from the 90-percent list after 6 months unless a resurvey submitted by the State during this probationary interim shows a rating of 90 percent or more. If, however, such check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for a period of 2 years from the date of the check survey unless a subsequent rating submitted during this period warrants its removal.

Communities which are now on the list should not permit their ratings to lapse, as ratings more than 2 years old cannot be used.

State milk-sanitation authorities who are not now equipped to determine municipal ratings are urged, in fairness to their communities, to equip themselves as soon as possible. The personnel required is small; in most States one milk specialist is sufficient for this work.

[1] Pub. Health Rep. 53: 1386 (1938). Reprint No. 1970.

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1947–June 1949

ALL MARKET MILK PASTEURIZED

Community	Percent of milk pasteurized	Date of rating
FLORIDA		
Panama City	100	Sept. 18, 1948
Pensacola	100	Dec. 12, 1947
GEORGIA		
Atlanta	100	Apr. 24, 1948
Columbus	100	June 25, 1948
Quitman	100	Aug. 25, 1948
West Point	100	Mar. 29, 1949
IDAHO		
Bonners Ferry	100	May 14, 1949
Caldwell	100	Apr. 14, 1949
Preston	100	Nov. 16, 1948
Sandpoint	100	May 14, 1949
ILLINOIS		
Champaign-Urbana	100	Aug. 18, 1948
Chicago	100	Sept 24, 1947
East Peoria	100	July 31, 1947
INDIANA		
Indianapolis	100	July 1948
Salem	100	Apr. 9, 1948
South Bend	100	Nov. 1948
KENTUCKY		
Bowling Green	100	Dec. 1, 1947
Owensboro	100	Apr. 8, 1949
OKLAHOMA		
Seminole	100	May 5, 1948
Sulphur	100	July 30, 1948
TENNESSEE		
Athens and McMinn Co	100	Dec. 2, 1947
Clinton	100	May 25, 1948
Erwin	100	Feb. 17, 1949
Fayetteville	100	May 10, 1949
Greenville	100	Dec. 5, 1947
Maryville-Alcoa	100	Aug. 31, 1948
Morristown	100	Dec. 4, 1947
Shelbyville	100	June 13, 1949
TEXAS		
Houston	100	Dec. 3, 1948
Galveston	100	Apr. 18, 1949
Lufkin	100	Apr. 12, 1949
Pampa	100	May 24 1948
San Antonio	100	June 21, 1948
Texarkana	100	Mar. 30, 1949
Texas City	100	Apr. 25, 1949
Tyler	100	Mar. 31, 1948
UTAH		
Ogden	100	June 1, 1949
Provo	100	Apr. 29, 1949
Salt Lake City	100	May 27, 1949
VIRGINIA		
Richmond	100	May 1948
Suffolk	100	Apr. 1948

BOTH RAW AND PASTUERIZED MARKET MILK

Community	Percent of milk pasteurized	Date of rating
FLORIDA		
Madison	62.5	Sept. 25, 1947
GEORGIA		
La Grange	76.2	Mar. 29, 1949
Macon	96.6	June 4, 1948
Thomasville	81.5	July 28, 1948
Tifton	92	Apr. 15, 1948
IDAHO		
Boise	99.3	Apr. 30, 1949
Fayette	77	Oct. 25, 1948
Payette	72	Apr. 14, 1949
Weiser	92.1	Apr. 13, 1949
NORTH CAROLINA		
Greensboro	96	July 1947
OKLAHOMA		
Lawton	92.3	June 30, 1948
Muskogee	88	Apr. 2, 1948
Shawnee	96	June 3, 1948
OREGON		
Portland	99.2	May 24, 1949
TENNESSEE		
Bristol	99	Dec. 10, 1947
Elizabethton	99	May 24, 1948
Johnson City and Washington County	96	Dec. 6, 1947
Kingsport	99	Dec. 11, 1947
Knoxville	99	Dec. 12, 1947
Pulaski	91.6	May 6, 1949
TEXAS		
Fort Worth	99.9	Mar. 9, 1948
Bryan	98.8	Feb. 12, 1949
Lubbock	98	Sept. 27, 1947
Palestine	79.8	Apr. 28, 1949
Paris	95.5	Feb. 12, 1949
Wichita Falls	99	Mar. 29, 1948
VIRGINIA		
Abingdon	75	Dec. 10, 1947
Bristol	99	Dec. 10, 1947
Emporia	26	Jan. 1948

NOTE. In these communities the pasteurized market milk shows a 90 percent or more compliance with the grade A pasteurized milk requirements and the raw market milk shows a 90 percent or more compliance with the grade A raw milk requirement of the Public Health Service Milk Ordinance and Code.

Note particularly the percentage of milk pasteurized in the various communities listed. This percentage is an important factor to consider in estimating the safety of a city's milk supply. All milk should be pasteurized or boiled, either commercially or at home, before it is consumed. See text for home method.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 23, 1949

A total of 1,444 cases of poliomyelitis was reported, as compared with 1,014 last week (an increase of 42 percent), 979 for the corresponding week last year (representing an increase of 37 percent) and a 5-year (1944–48) median of 568. The largest numerical increases were reported in the North Central areas. Slight decreases occurred in the West South Central and Pacific areas. Figures for the week by geographic divisions are as follows (last week's figures in parentheses): New England 67 (45), Middle Atlantic 143 (93), East North Central 308 (166), West North Central 290 (174), South Atlantic 86 (36), East South Central 120 (66), West South Central 273 (293), Mountain 61 (40), Pacific 96 (101). Twenty-one States reported more than 17 cases each, as follows (last week's figures in parentheses): *Increases*—Massachusetts 31 (19), New York 116 (72), New Jersey 21 (14), Ohio 38 (22). Indiana 84 (52), Illinois 75 (55), Michigan 82 (32), Wisconsin 29 (5), Minnesota 79 (51), Iowa 45 (30), Missouri 73 (40), Nebraska 25 (13), Kansas 45 (19), West Virginia 21 (9), Kentucky 41 (20), Tennessee 40 (21), Mississippi 25 (17), Oklahoma 80 (74); *decreases*—Arkansas 91 (99), Texas 89 (112), California 80 (83). Since March 19 (average week of seasonal low incidence), a total of 5,415 cases has been reported, as compared with 4,230 for the same period last year and a 5-year median for the period of 2,057.

Of 32 cases of Rocky Mountain spotted fever reported (last week 17, 5-year median 27), 22 occurred in the South Atlantic and South Central areas (9 in North Carolina, 5 each in Virginia and Tennessee), 3 in Wyoming, 2 in Pennsylvania and 1 each in Ohio, Indiana, Illinois, Minnesota, and California.

Of 27 cases of tularemia reported in 11 States, 14 occurred in Arkansas; no other State reported more than 2 cases.

Deaths recorded during the week in 94 large cities in the United States totaled 8,233, as compared with 8,320 last week, 8,031 and 8,135, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,135. The total for the year to date is 272,687, as compared with 275,332 for the corresponding period last year. Infant deaths during the week totaled 577, last week 617, 3-year median 671. The cumulative figure is 18,742, same period last year 19,518.

Telegraphic case reports from State health officers for week ended July 23, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [c]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	......	......	......	13	1	5	14	......	2	......	......	......	2	......
New Hampshire	......	......	......	2	......	......	5	......	1	......	......	......	......	......
Vermont	......	......	......	10	......	......	3	......	1	......	......	......	......	......
Massachusetts	4	1	......	80	......	......	31	......	27	......	......	1	102	......
Rhode Island	......	......	......	7	......	4	5	......	1	......	......	......	1	......
Connecticut	......	......	......	67	1	9	9	......	1	......	......	2	36	......
MIDDLE ATLANTIC														
New York	4	......	(e)	314	5	99	116	......	d 23	......	......	3	233	7
New Jersey	......	......	1	189	4	41	21	......	2	......	......	1	70	1
Pennsylvania	6	......	(e)	182	1	......	6	2	9	......	......	10	86	1
EAST NORTH CENTRAL														
Ohio	3	......	......	362	3	34	38	1	26	......	1	5	121	6
Indiana	6	2	......	30	1	3	84	1	3	......	......	......	26	6
Illinois	......	3	......	115	4	57	75	1	8	......	......	1	153	2
Michigan [a]	......	1	......	279	2	26	82	......	22	......	......	2	95	5
Wisconsin	......	......	......	344	......	5	29	......	9	......	1	......	90	1
WEST NORTH CENTRAL														
Minnesota	......	......	......	25	1	5	79	1	4	......	......	2	4	......
Iowa	1	1	......	24	......	2	45	......	2	......	......	......	2	2
Missouri	......	......	1	5	2	12	73	......	7	......	......	3	5	......
North Dakota	......	1	......	21	2	......	17	......	......	......	......	......	14	......
South Dakota	......	......	......	6	......	3	6	......	1	......	......	......	......	......
Nebraska	2	......	......	......	1	......	25	......	9	......	......	......	......	......
Kansas	......	......	......	17	1	6	45	......	4	......	......	......	15	......
SOUTH ATLANTIC														
Delaware	......	......	......	3	......	......	......	......	2	......	......	......	3	......
Maryland [a]	......	......	1	15	......	19	4	2	1	......	......	4	29	......
District of Columbia	1	......	......	21	......	7	7	......	1	......	......	2	1	......
Virginia	3	......	30	59	......	22	17	5	7	......	1	3	21	2
West Virginia	1	......	1	21	2	1	21	......	......	......	......	3	18	......
North Carolina	1	......	......	45	1	......	17	9	3	......	......	3	55	......
South Carolina	3	......	19	27	1	12	3	......	2	......	1	......	2	1

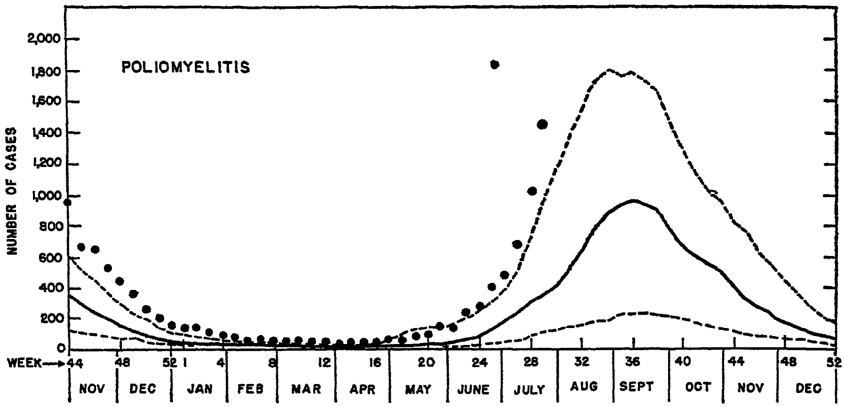
Georgia	18			24	1	13	14		1		2	9	1	4
Florida	1			29	1	5	3		1			1	2	2
EAST SOUTH CENTRAL														
Kentucky	1			24	1	1	41		3			5	70	3
Tennessee	2		11	48	1	32	40	5	5		1	17	52	
Alabama	2		8	3	1	22	14		4			1	18	4
Mississippi [a]	11		5	17	1	14	25		2		1	9	8	
WEST SOUTH CENTRAL														
Arkansas			13	16	1	5	91				14	8	23	3
Louisiana	2			2		34	13		1			3	1	
Oklahoma			12	4	1	6	80		1		2	5	4	1
Texas	16	1	237	113	3	182	89	1	12		2	6	88	8
MOUNTAIN														
Montana			1	17			2		1		1			
Idaho	2		4	55		1	16		[d] 14				4	
Wyoming				1		1	7	3						
Colorado			3	30	2	7	16		2				17	1
New Mexico	1			11		16	13					1	4	
Arizona			5	3		1	4		1				11	
Utah [a]			2	21		3							31	
Nevada							3							
PACIFIC														
Washington				63	1		12		5				16	
Oregon				24	1	3	4		1				38	
California	9		2	153	1	18	80	1	[d] 26			1	78	1
Total	100	10	356	2,941	49	736	1,444	32	258		27	111	1,650	
Median, 1944-48	154	15	492	2,361	89		568	27	686	1	16	109	2,384	
Year to date 29 weeks	3,952	299	75,469	581,871	2,146	52,495	6,339	307	57,545	39	703	1,620	31,818	
Median, 1944-48	6,548	264	189,694	539,597	4,199		2,320	260	84,478	255	546	1,930	55,284	
Seasonal low week ends	(27th) July 9		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32d) Aug. 14	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	184		111,739	634,264	2,990		5,415		80,243	49		1,160	41,851	
Median, 1943-48 [b]	305		333,917	574,526	5,703		2,057		123,049	338		1,455	84,652	

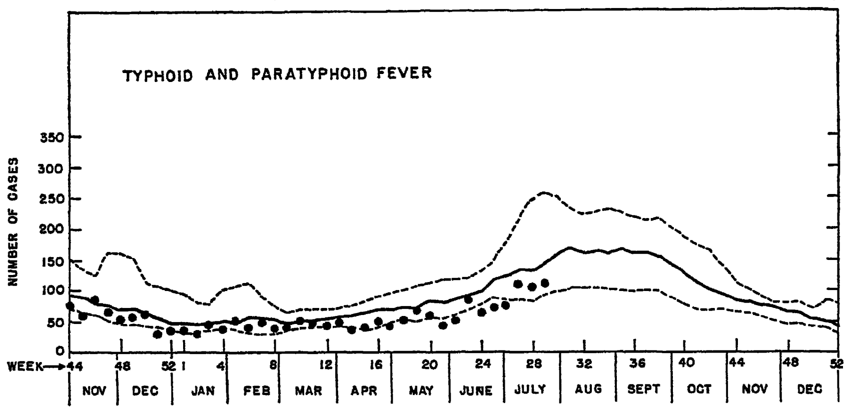
[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for diphtheria, poliomyelitis, and typhoid fever the corresponding periods are 1944-45 to 1948-49.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately, as follows: New Jersey 1, Minnesota 1, Virginia 2, Georgia 2, Tennessee 5, Texas 1. Cases reported as Salmonella infection, not included in the table, were as follows: Massachusetts 1.
Psittacosis: California, June, 1 case.

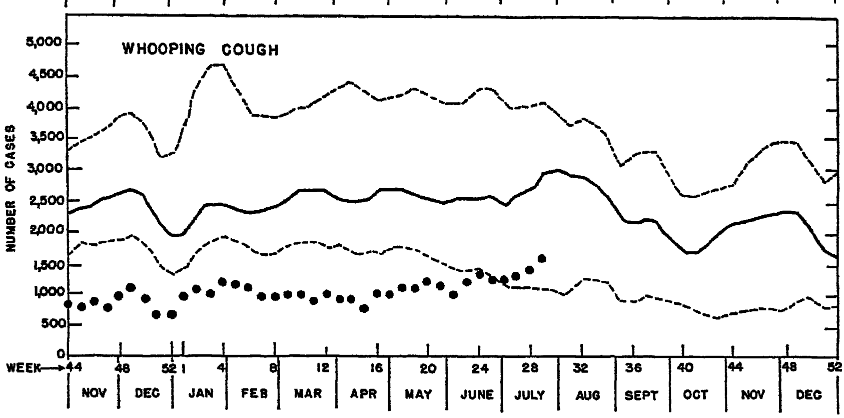
Alaska: No cases reported of the diseases included in the table.
Hawaii Territory: Measles, 14.

Communicable Disease Charts

All reporting States, November 1948 through July 23, 1949







The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is a median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1949.

PLAGUE INFECTION IN PARK COUNTY, COLO.

Under date of July 22, plague infection was reported proved in Park County, Colo., at a location 1 mile south and 3 miles west of Fairplay in a pool of 6 fleas from 5 ground squirrels, *Citellus richardsonii elegans*, trapped July 7, in a pool of 16 fleas from 1 prairie dog, *Cynomys gunnisoni*, shot on the same date, and in a pool of 18 fleas from 2 prairie dogs, same species, shot July 8.

TERRITORIES AND POSSESSIONS

Virgin Islands

Notifiable diseases—April–June 1949.—During the months of April, May, and June, 1949, cases of certain notifiable diseases were reported in the Virgin Islands of the United States as follows:

Disease	April	May	June
Cancer	1	2	1
Chickenpox	2	3	
Gonorrhea	14	11	14
Hookworm disease	2	2	
Meningitis, meningococcal	1		
Mumps		1	
Pellagra		2	
Pneumonia (lobar)			1
Syphilis	9	8	6

DEATHS DURING WEEK ENDED JULY 16, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended July 16, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,320	8,674
Median for 3 prior years	8,319	
Total deaths, first 28 weeks of year	264,454	267,301
Deaths under 1 year of age	617	640
Median for 3 prior years	654	
Deaths under 1 year of age, first 28 weeks of year	18,165	18,889
Data from industrial insurance companies:		
Policies in force	70,325,670	70,995,534
Number of death claims	12,698	13,059
Death claims per 1,000 policies in force, annual rate	9.4	9.6
Death claims per 1,000 policies, first 28 weeks of year, annual rate	9.4	9.8

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended July 2, 1949.—During the week ended July 2, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		7		66	260	46	75	44	58	556
Diphtheria				5	2	1		1		9
Dysentery, bacillary				1						1
German measles				22	26	2	17	44	4	115
Influenza			1		2	2	1		3	9
Measles		32	4	172	235	84	178	166	251	1,122
Meningitis, meningococcal		1		2						3
Mumps		35	1	35	131	10		9	43	264
Poliomyelitis		1		4	6	1			9	21
Scarlet fever				18	30	5		8	6	67
Tuberculosis (all forms)		1	10	101	22	30	3	20	26	213
Typhoid and paratyphoid fever				6	1					7
Venereal diseases:										
Gonorrhea		13	21	96	33	24	12	28	78	305
Syphilis		10	2	61	21	9	8	3	15	129
Whooping cough			2	56	13			1	6	78

JAPAN

Notifiable diseases—4 weeks ended June 25, 1949, and accumulated totals for the year to date.—For the 4 weeks ended June 25, 1949, and for the year to date, certain notifiable diseases have been reported in Japan as follows:

Disease	4 weeks ended June 25, 1949		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	878	82	8,471	871
Dysentery, unspecified	1,286	338	2,659	701
Encephalitis, Japanese "B"	4	2	5	2
Gonorrhea	15,726		92,278	
Influenza	60		1,676	
Malaria	645	2	1,570	23
Measles	31,719		127,242	
Meningitis, epidemic	90	45	782	220
Paratyphoid fever	249	10	928	34
Pneumonia	10,450		91,483	
Scarlet fever	405	2	2,568	37
Smallpox	19	1	117	11
Syphilis	16,656		103,085	
Tuberculosis	42,256		225,994	
Typhoid fever	607	58	2,439	300
Typhus fever	5	2	84	6
Whooping cough	13,221		47,131	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma.—During the period May 8–28, 1949, 115 cases of cholera with 81 deaths were reported in Burma, by Divisions or Districts as follows: Irrawaddy, 111 cases, 77 deaths; Pegu, 2 cases, 2 deaths; Tenasserim, 2 cases, 2 deaths. During the week ended July 9, 6 cases were reported in Bassein.

India—Bombay—Calcutta—Cawnpore—Delhi—Madras.— (During the week ended July 16, 1949, 1 case of cholera (imported) was reported in Bombay, 67 cases in Calcutta, 5 cases in Cawnpore, 7 cases in Delhi, and 16 cases in Madras.

Plague

Belgian Congo—Stanleyville Province.—On July 8, 1949, 2 fatal cases of plague were reported in the village of Daidjos, northeast of Blukwa, and on July 11 a fatal case was reported in the village of Tchetchu, west of Blukwa, the localities being new foci but in the general area in which cases have previously been reported.

British East Africa—Kenya.—During the week ended June 4, 1949, 2 cases of plague were reported in the Kiambu District of Kenya, a new focus.

India—Calcutta.—During the week ended July 16, 1949, 10 cases of plague were reported in Calcutta.

Indochina—Saigon.—Saigon was declared infected with plague on July 20, 1949.

Union of South Africa—Cape Province—Southwest Africa.—During the two weeks ended July 9, 1949, 9 cases of plague with 2 deaths were reported in Cape Province distributed among new foci in 7 districts. During the week ended June 25, plague was reported present in Rehoboth, South West Africa, also a new focus of the disease.

Smallpox

Netherlands Indies—Batavia (Java)—Palembang (Sumatra).—During the week ended July 16, 1949, 186 cases of smallpox were reported in Batavia and 9 cases in Palembang.

Nigeria.—During the period May 15–June 11, 1949, 873 cases of smallpox with 151 deaths were reported in Nigeria, of which 33 cases with 9 deaths occurred in Sapele and 33 cases with 3 deaths occurred in Lagos.

Typhus Fever

Afghanistan.—Outbreaks of typhus fever were reported in Afghanistan on July 22, 1949.

Union of South Africa—Port Elizabeth.—During the week ended June 25, 1949, typhus fever was reported present in Port Elizabeth.

Yellow Fever

Gold Coast.—According to information received on July 13, 1949, by the World Health Organization 4 further suspected cases of yellow fever have been reported from Mines Hospital at Akwatia, Gold Coast. Diagnosis had not been confirmed. (For recent previous cases in the Gold Coast, see Pub. Health Rep. July 15, 1949, p. 908.)

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 AUGUST 19, 1949 NUMBER 33

IN THIS ISSUE

An Epidemiologic Study of Brucellosis in Minnesota

Human and Bovine Brucellosis in Minnesota

Symposium on Brucellosis

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
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PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

CONTENTS

Page

An epidemiologic study of brucellosis in Minnesota. Robert L. Magoffin, Paul Kabler, Wesley W. Spink, and Dean Fleming ---- 1021
Relation of human and bovine brucellosis in Minnesota. D. S. Fleming, and M. H. Roepke ---- 1044
Symposium on brucellosis ---- 1051
Refresher courses in laboratory diagnosis ---- 1059

INCIDENCE OF DISEASE

United States:
- Reports from States for week ended July 30, 1949 ---- 1053
- Plague (human) cases in Taos and Sandoval Counties, N. Mex ---- 1056
- Plague infection in Kansas and New Mexico ---- 1056
- Deaths during week ended July 23, 1949 ---- 1056

Foreign reports:
- Canada—Provinces—Notifiable diseases—Week ended July 9, 1949 ---- 1057
- Norway—Notifiable diseases—April 1949 ---- 1057
- Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—
  - Cholera ---- 1058
  - Plague ---- 1058
  - Smallpox ---- 1058
  - Typhus fever ---- 1058
  - Yellow fever ---- 1058

Public Health Reports

Vol. 64 • AUGUST 19, 1949 • *No. 33*

An Epidemiologic Study of Brucellosis in Minnesota

By Robert L. Magoffin, M. D.,* Paul Kabler, M. D.,† Wesley W. Spink, M. D.,** and Dean Fleming, M. D.†

While working with the Mediterranean Fever Commission on the Island of Malta in 1905, Zammit (*1*) discovered that goats were a natural reservoir for undulant fever. Other members of the Commission confirmed this observation and incriminated the milk of these animals as the important medium of transmission of the disease to human beings (*2*). Following an order issued in June 1906, prohibiting the use of raw goat's milk by personnel of the Royal Army and Navy stationed at Malta, the incidence of undulant fever in the military forces dropped precipitiously. Effective control of this disease, thought to be largely a local problem in the Mediterranean, appeared to be at hand, yet today brucellosis ranks as the most prevalent disease of animals transmitted to man.

Recognition of the disease in the United States was slow and scattered. Although it now appears highly probable, as proposed by Craig (*3*) in 1905, that many febrile cases formerly diagnosed as atypical typhoid and typho-malarial fever were actually undulant fever, the latter was considered to be a rare imported disease found only in individuals from tropical areas who had had contact with goats. Evidence that the disease was endemic in the United States slowly accumulated as isolated cases from goat-raising areas were reported in 1911 by Gentry and Ferenbaugh (*4*, *5*) from Texas and by Yount and Looney (*6*) from Arizona in 1913.

While undulant fever was being viewed with desultory interest as a disease solely of caprine origin, an apparently unrelated series of observations on contagious abortion of cattle and its etiologic agent were in progress. Bang (*7*), in 1897, succeeded in isolating a small bacillus from the uterus of a cow with threatened abortion and established that this organism was the etiologic agent of bovine contagious abortion. A number of other workers confirmed these observations

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and the organism became widely known as *Bacillus abortus* (Bang) (*8, 9*).

Schroeder and Cotton (*10*) discovered in 1911 that milk obtained from certain cows, when injected into guinea pigs, produced lesions resembling tuberculosis. The same observation was made independently by Smith and Fabyan (*11*) in 1912 who called attention to the similarity of these "milk injection" lesions to those produced by *B. abortus* in guinea pigs. Both groups subsequently isolated the organism from cow's milk and identified it as *B. abortus* (*10, 12*). These findings caused Schroeder and Cotton (*10*) to propose that *B. abortus* might well be pathogenic for man. The question of human pathogenicity was further stimulated by Larson and Sedgwick (*13*) who demonstrated complement-fixing antibodies against *B. abortus* in the blood of children who drank raw milk. Cooledge (*14*) fed viable organisms in milk to several human volunteers without any evidence of clinical illness resulting. He was able to demonstrate *B. abortus* agglutinins in these individuals but concluded that they were absorbed from the ingested milk. The isolation of a similar organism from swine and its association with infectious abortion in sows was first reported in 1914 by Traum (*15*).

The link between these diverse observations was furnished in 1918 by Alice Evans (*16*) who found that *Micrococcus melitensis*, the known etiologic agent of undulant fever which had first been isolated at autopsy by Bruce in 1887, was morphologically, culturally, biochemically, and serologically related to *B. abortus*. Following the suggestion of Meyer (*17*) in 1920, the generic name *Brucella* found general acceptance, and after several years of confused terminology the caprine, bovine, and porcine organisms were designated, as proposed by Huddleson (*18*), as separate species: *Br. melitensis*, *Br. abortus*, and *Br. suis*.

Following the disclosure of the true relationship between *Micrococcus melitensis* (Bruce) and *Bacillus abortus* (Bang), Keefer (*19*) reported the first proved case of human brucellosis in this country of non-caprine origin. Other cases of non-caprine origin in the United States were soon reported by Gage and Gregory (*20*), Huddleson (*21*), and Carpenter and Merriam (*22*). Concurrent observations appeared in other countries (*23*).

Although several of these early case reports indicated that contact with infected animals was a probable means of infection, and the original reports of the Commission on Mediterranean Fever pointed out that infection may occur through small wounds of the skin, attention in this country centered on contaminated milk as a source of human disease. Evans (*24*), Fleischner and Meyer (*25*), Carpenter and Baker (*26*), and others (*27, 28, 29, 30, 31*) pursued the problem and demonstrated the widespread occurrence of *Br. abortus* in raw milk

and dairy products. These observations proved that viable *Brucella* were being ingested regularly in raw market milk, including milk from certified herds.

The relatively low incidence of recognized infection despite established proof that viable organisms were commonly ingested led a number of workers to doubt the pathogenicity of the bovine organism. Both Cooledge (*14*) in 1916 and Morales-Otero (*32*) in 1929 were unable to produce demonstrable disease by feeding viable *Br. abortus* in milk to a small number of human volunteers, although Morales-Otero did produce illness in 2 individuals who had ingested *Br. suis*. Nicolle, Burnet, and Conseil (*33*) failed to produce evidence of infection following subcutaneous inoculation of *Br. abortus* in 5 individuals. Huddleson (*34*), working with monkeys, observed that *Br. suis* produced a severe disease ending in death, whereas *Br. abortus* induced a mild infection from which the animals readily recovered. In 1930, Hardy and co-workers (*35*) reported data on 14 patients from whom *Br. abortus* had been isolated. Illness in the group ranged from a mild ambulatory form of the disease to severe, protracted disability. They observed that while, in general, *suis* infections tend to be more severe than those due to *Br. abortus*, this difference was not sufficiently consistent to permit a clinical differentiation in an individual case. This evaluation of the relative pathogenicity of the two species of *Brucella* is now generally accepted. A number of cases of fatal *Br. abortus* infection have been reported (*36*, *37*).

The importance of the skin as a portal of entry was emphasized by Hardy, Hudson, and Jordan (*38*). Noting the frequency of infection in employees in meat-packing plants and farmers, they concluded that the intimate types of contact with infectious materials common to these occupations resulted in infections through the skin. They demonstrated that 100 percent infection in guinea pigs was obtained by applying *Brucella* to the shaved and abraded skin. Eighty percent infection was obtained similarly in a group of animals in which the hair was clipped without visible trauma to the skin, whereas only 22 percent of the animals were infected by ingestion of the organisms.

Principles of Epidemiology

From the foregoing historical summary, it is apparent that most of the major factors in the epidemiology of brucellosis in the United States were recognized by 1930. It had been established that a large reservoir of infection was present in naturally infected goats, swine, and cattle; that the organisms isolated from each of these groups of animals constitute separate though closely related species which can be differentiated on the basis of cultural and metabolic characteristics and which vary in invasiveness and in the severity of disease produced in animals; and that each of the three species may produce

human illness. Subsequently, it has been learned that other domestic animals including horses (*39, 40*) and dogs (*35, 41*) may be naturally infected, and that even chickens may be susceptible (*42*).

Discovery of cross infections in animals by each of the three species has added to the problem of ultimate control. Huddleson (*18*) first isolated *Br. suis* from cattle in 1929. Epidemiologic studies in Iowa indicated that transmission of the more virulent porcine strains from cattle to man may occur. Dramatic confirmation of this means of spread subsequently appeared in several milk-borne epidemics of brucellosis due to *Br. suis* (*43, 44, 45*). Cattle may also become infected with *Br. melitensis*, which has been isolated from cow's milk, but this type of cross infection appears to be uncommon in the United States (*46, 47*). For years it was believed that human infection with *Br. melitensis* in the United States was confined almost exclusively to the goat-raising areas of the South and Southwest. However, in 1946, Jordan and Borts (*48*) reported the occurrence of human *melitensis* infections in Iowa with evidence that hogs were the immediate source of infection. Isolation of *Br. melitensis* from the tissues of sows in Iowa followed shortly (*49*). Human *melitensis* infection derived from contact with hogs in Minnesota has also been reported (*50*). It now appears that all three species of *Brucella* may infect cattle, hogs, sheep, and goats. Natural infections of hogs with *Br. abortus* have been recently reported (*51*). Apparently goats have not been encountered that are infected with *Br. abortus* or *Br. suis*.

Brucellosis may be transmitted to man from the animal reservoir by two well-established routes: (1) contact with an infected animal, its tissues, blood, secretions, or products of abortion and (2) the ingestion of contaminated milk, cream, cheese, or other dairy products. Air-borne infection by dust or droplets has also been suggested (*52, 53*). Documented cases of inter-human transmission are rare, but references to infection via coitus and maternal milk have appeared in the literature (*52*). There are indications that the disease can be accidentally transmitted as a result of blood transfusions (*54*).

The portal of entry is dependent upon the mode of transmission. Since the early experimental and epidemiologic observations of Hardy and his associates (*35, 38*), it has been generally accepted that invasion through the skin is the most probable portal of entry following direct contact with infected animals or tissues. Small cuts or abrasions on the skin undoubtedly facilitate this mode of infection, but the possibility of entry through the unbroken skin cannot be excluded. Following ingestion of infected materials, the oropharynx is presumed to be the site of invasion. Little precise information is available concerning the ability of *Brucella* to survive the gastric barrier and invade through the stomach or intestine. The probability that the respiratory tract may serve as a portal of entry in human brucellosis is supported by

successful experimental infection of guinea pigs (*52*) and monkeys (*55*) via this route. Cattle are readily infected by inoculation of *Brucella* into the conjunctival sac which suggests that the conjunctiva may also serve as the portal of entry in some human infections, particularly of laboratory personnel (*56*).

With this complexity of possible sources of infection and means of its transmission from animals to man, it is apparent that major factors in the epidemiology of brucellosis may vary widely in different localities. An over-all picture of brucellosis in the United States can only be completed by careful regional studies. Relatively few studies of local epidemiologic factors have appeared in the literature. Carpenter and King (*57*), Orr and Huddleson (*58*), and Simpson (*59*) have reported observations from certain geographical areas dealing primarily with milk-borne infections. These authors found bovine sources to be of primary importance in the areas studied in New York, Michigan, and Ohio, respectively. In Indiana, a broad cooperative study to determine the incidence of brucellosis and types of infection in both the livestock and human population of representative rural areas was initiated in June 1946, but only preliminary reports have appeared (*47*). The most notable contributions to the epidemiology of brucellosis have been the detailed studies from Iowa by Hardy, Jordan, and Borts continued over a period of 20 years. Their first survey, appearing in 1930, was based on a study of 300 patients, from whom *Brucella* was isolated in 48 cases (*35*). The sources and routes of infection in Iowa were detailed and showed a predominance of infection due to *Br. suis*. A number of subsequent reports have supplemented the intial study (*60, 61*). These workers emphasized the need for intensive studies in other areas to contribute to the general knowledge and pointed out the likelihood of error in assuming that the factors which have proved to operate in the transmission of brucellosis in one locality are of equal importance in all areas. It is with this view in mind that the present report was prepared on brucellosis in Minnesota.

Methods of Study

This report represents a joint study made possible through the collaboration of the Sections of Preventable Diseases and Medical Laboratories of the Minnesota Department of Health, the University of Minnesota Hospitals, and practicing physicians throughout the State. The data were derived primarily from a study of 268 patients from whom *Brucella* was isolated by the Medical Laboratories of the Minnesota Department of Health and the University Hospitals from January 1, 1945, through June 30, 1948. Duplicate isolations from both laboratories were obtained in a number of cases making a total of 333 strains.

The technique of blood culture employed was as follows: Five

milliliters of blood, drawn aseptically, were inserted by needle into a 2-ounce rubber diaphragm screw-capped bottle containing 25 milliliters of sterile bacto-tryptose broth, pH 6.8, and one percent sodium citrate. Prepared culture outfits were mailed on request to physicians who then inserted the blood and returned the bottle to the laboratory by mail. Upon receipt of the culture in the laboratory, approximately 10 percent of the air was aseptically removed and replaced by an equal volume of CO_2. After incubating the broth culture for 5 days at 37° C., four tubes of bacto-tryptose agar, pH 6.8, were inoculated with 1 milliliter each from the broth culture. Two of the tubes were incubated aerobically and two under 10 percent CO_2 at 37° C. The original broth culture was returned to the incubator for an additional 10 days at the end of which time a second set of four subcultures was inoculated. Each set of subcultures was observed every other day for 2 weeks. No blood cultures were discarded before 30 days of observation.

Identification of the species of *Brucella* was carried out with every freshly isolated strain in the Department of Health laboratories based upon the requirement of carbon dioxide for growth, growth characteristics on dye plates and the production of hydrogen sulfide (*18, 62*).

By focusing the study on this group of proved cases all speculation about the diagnosis in the individual case was removed and the particular species of *Brucella* was established and correlated with the source of the infection. A complete study of all phases of the illness at the university hospitals was possible in 41 of the patients. In the remaining cases, data were obtained from individual reports submitted by attending physicians throughout the State. These included information on occupation, use of raw milk products, contacts with animals, any known abortions or other evidence of brucellosis in livestock, and a brief statement of symptoms and date of the onset of illness. In only 13 of the 268 cases were reports lacking or grossly incomplete, a fact which emphasizes the interest and cooperation of Minnesota physicians in the study of this disease. Further study was made in a number of cases through visits to the homes of patients by physicians from the State Department of Health. In addition to this information, data are presented on the cases of brucellosis reported annually to the Minnesota Department of Health since 1927 on which less detailed information is available.

Incidence of Human Brucellosis

The first cases of human brucellosis in residents of Minnesota were reported in 1927. The number of reported cases increased from 12 in 1928 to 62 in 1932 and to 113 in 1935. During the following 4 years, the number varied from 77 to 92 cases annually. A steady

increase in the number of reported cases began in 1940 and continued to a peak of 403 cases in 1946. In the period of 11 years from 1927 through 1937, 710 cases were reported. In the following 10-year period the number increased to 2,605, a total of 3,315 cases having been reported by January 1, 1947. It is difficult to determine how accurately these figures represent the actual incidence of active brucellosis in this State, but it may be reasonably assumed that the addition of all diagnosed but unreported cases, plus unrecognized mild or ambulatory cases would appreciably increase the incidence. During 1947, when 378 cases of brucellosis were reported in Minnesota, *Brucella* agglutinins were found to be present in a titer of 1:40 or higher in 1,201 human sera submitted for this examination to the laboratories of the Minnesota Department of Health.

The annual morbidity rate for brucellosis in Minnesota increased markedly during World War II and the immediate post-war period. For the 5-year period 1937–41, the average annual morbidity rate per 100,000 population was 4.1. In contrast, the estimated average annual rate for 1942–47 was 12.9. A similar increase has been reported in Iowa and undoubtedly has occurred in other States (*61*). It is apparent that brucellosis is a problem of growing concern in the North Central States region.

Reservoir of Brucellosis

The major animal reservoir of brucellosis in Minnesota resides in cattle. Swine, though numerically equal, are raised on fewer farms and contribute to fewer human contacts than do cattle. Horses and sheep comprise a significant number of domestic animals and should not be overlooked in any census of the animal reservoir. Agglutination tests for Bang's disease among horses in Minnesota revealed 2.9 percent reactors in one study (*63*).

A sharp increase in bovine brucellosis has occurred in Minnesota since 1942 as indicated by agglutination tests on cattle. From 1934, when the Federal–State Bang's disease program was first initiated in Minnesota, through 1939, over 870,000 cattle distributed in 58,473 herds were tested at least once (*63*). In subsequent retests of the same herds, 537,000 animals were investigated. On the initial test 11.4 percent of the animals were found to be positive. On the first retest the number of reactors had been reduced to 3.9 percent of the group. Of the herds tested, 61.3 percent were completely negative initially and 71.7 percent were negative on retesting. The over-all incidence of reactors continued to decline until 1942 when only 1.48 percent reactors were found in over 1,700,000 cattle tested. From that year, however, the incidence of infection steadily increased to 8.2 percent in 1946. The total number of cattle on Minnesota farms in 1947 was estimated to be 3,527,000 (*64*).

There is little available information on the incidence of brucellosis in other livestock in Minnesota, although it is highly probable that the same conditions existing in cattle have operated to bring about an increase in swine brucellosis. It is to be emphasized that in Minnesota, swine constitute the reservoir of *Br. melitensis* as well as *Br. suis*. Although these two species together were found to represent less than 15 percent of the human infections in the present study, they produce a more severe disease than *Br. abortus* in most cases. Since it is already well recognized that *Br. suis* may spread from infected swine to dairy cattle on the same farm, the potential danger of widespread dissemination of both of the more virulent species of *Brucella* from swine to other farm animals is apparent.

Analysis of Proved Cases of Human Brucellosis

Species Distribution

Grouping of bacteriologically proved cases according to the species of *Brucella* isolated shows a striking predominance of *abortus* infections in Minnesota. It is of interest that the first 36 strains isolated from human cases up to 1935 revealed only 12 strains of *Br. abortus*,

Table 1. *Species distribution of* Brucella *isolated in Minnesota from 268 patients (January 1945 to June 30, 1948)*

Year	*Brucella abortus*		*Brucella melitensis*		*Brucella suis*		Total patients
	Number of patients	Percent	Number of patients	Percent	Number of patients	Percent	
1945	51	76.1	9	13.4	7	10.5	67
1946	76	90.5	4	4.7	4	4.7	84
1947	71	86.6	6	7.3	5	6.1	82
1948 (to June 30)	32	91.4	3	8.6	0	0.0	35
Total	230	85.8	22	8.2	16	6.0	268

whereas 24 were identified as *Br. suis* (*62*). The discrepancy between these findings and those of recent years can probably be accounted for by the large proportion of packing plant workers in the early sample and the probability that cultural studies during those years were attempted only in the more severe and obvious cases. The combination of these factors could readily have resulted in selecting a group of cases that was poorly representative of all *Brucella* infections in the State. It is also possible that there has been an actual increase in the proportion of *abortus* infections, or that the *abortus* variety has acquired greater invasiveness for man.

Table 1 summarizes the species distribution of *Brucella* isolated from 268 patients from January 1945, through June 1948. *Brucella abortus* was the etiologic agent in 230 cases, or 85.8 percent. Of the remaining 38 cases, *Brucella melitensis* was recovered in 22 (8.2 per-

cent) and *Brucella suis* in 16 (6.0 percent). A similar predominance of *abortus* infections has been found in Wisconsin and Michigan (*65*). Like Minnesota, these states engage in extensive dairy farming. In contrast, *Br. suis* has consistently been the most common species isolated from patients in Iowa. In a recent summary of 420 strains isolated by the Iowa State Hygienic Laboratory, 259 were *Br. suis;* 112, *Br. abortus;* and 49, *Br. melitensis* (*66*). It is remarkable that recognized *Br. suis* infection remains relatively uncommon in Minnesota even in the southern portion of the state bordering on Iowa where there are considerable numbers of swine.

Sex and Age Distribution

Slightly over three-fourths (77.5 percent) of all the reported cases of brucellosis in Minnesota have occurred in males. This ratio of males to females has remained quite constant. Of 710 cases reported from 1927 through 1937, 77.2 percent were males. In the following decade 2,605 cases were reported of which 77.6 percent were males. In the present study of 268 proved cases, males constituted 78.4 percent of the group (table 2). A similar preponderance of males has been

Table 2. *Distribution of 268 cases of proved brucellosis in Minnesota according to sex (January 1945 to June 30, 1948)*

Age group	Males		Females	
	Number	Percent	Number	Percent
Children 12 and under	10	50.0	10	50.0
Adults 13–54	188	83.5	37	16.5
Adults 55 and over	12	52.2	11	47.8
All cases	210	78.4	58	21.6

noted in reports from various other parts of the country. Hardy and his group (*60*) reported 76 percent males in Iowa. Smaller series from Alabama (67) and Indiana (*47*) gave the incidence of males as 79.1 and 87.3 percent, respectively. As pointed out by Hardy in 1930, it need not be assumed that males are more susceptible to brucellosis than females. The unequal distribution is readily explained by a much greater opportunity among males for occupational contact with infectious materials. In the present study the sex incidence was approximately equal in children under 13 years of age and in adults over 55, groups which have infrequent contact with animals. Of the 74 cases of all ages who gave no history of contact with animals, only 38 or 51 percent were males. Similar observations have been made in Iowa (*35, 68*). Thus under the same conditions of exposure, both sexes appear to be equally susceptible.

The age of the patients in the present study ranged from 2 to 74 years. The great majority were between the ages of 12 and 60, but

Table 3. *Distribution of 268 proved cases of brucellosis according to age and sex in Minnesota (January 1945 to June 30, 1948)*

Age in years	*Br. abortus*		*Br. suis*		*Br. melitensis*		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
2	0	2	-------	-------	-------	-------	-------	2
4	0	2	-------	-------	-------	-------	-------	2
5	0	1	-------	-------	-------	-------	-------	1
6	1	2	-------	-------	-------	-------	1	2
9	1	0	-------	-------	-------	-------	1	0
10-14	11	4	-------	-------	1	-------	12	4
15-19	12	2	-------	1	1	-------	13	3
20-24	14	3	1	-------	1	-------	16	3
25-29	20	7	2	-------	4	-------	26	7
30-34	42	4	5	-------	5	-------	52	4
35-39	21	5	3	-------	2	-------	26	5
40-44	18	2	-------	1	2	1	20	4
45-49	14	5	1	-------	1	-------	16	5
50-54	10	5	1	-------	4	-------	15	5
55-59	6	4	-------	-------	-------	-------	6	4
60-64	4	3	-------	-------	-------	-------	4	3
66	0	1	-------	-------	-------	-------	0	1
67	0	2	-------	-------	-------	-------	0	2
72	0	1	1	-------	-------	-------	1	1
74	1	0	-------	-------	-------	-------	1	0
Total	175	55	14	2	21	1	210	58

33 of the 268 cases were outside of this age bracket. The incidence in males rose rapidly during young adulthood, reached a peak in the 30- to 34-year age group, and thereafter declined gradually (table 3, fig. 1). Three-fourths of the males were in the third, fourth or fifth decade of life, the remaining fourth being scattered through the first, second, sixth and seventh decades. The female cases, on the other hand, showed an almost uniform distribution throughout all age groups. The age distribution of females parallels that of all cases having no history of animal contact (fig. 2).

The question has frequently been raised as to the relative susceptibility of children to brucellosis. In this series, organisms were isolated from 9 children under the age of 10, including four cases under 5 years of age, a total of 3.4 percent of the entire group. Of the 3,315 cases of brucellosis reported in Minnesota since 1927, 102, or 3.1 percent, were children under the age of 10. If consideration is limited to the group of cases having no contact with animals, the proportion of children is increased but still lags considerably behind the incidence in young and middle-aged adults. In the 74 proved cases with no animal contacts nearly 10 percent were children under 10 years of age. In Iowa, Jordan (*69*) found the specific annual rate of reported cases to be 0.9 per 100,000 in rural children under 12 years of age and 0.4 in urban children as compared with 1.4 in urban housewives. It appears that even in selected groups of cases in which infection is presumably contracted from raw milk, recognized infections in children are significantly less than in adults.

Distribution of 268 Culturally Proven Cases of Brucellosis

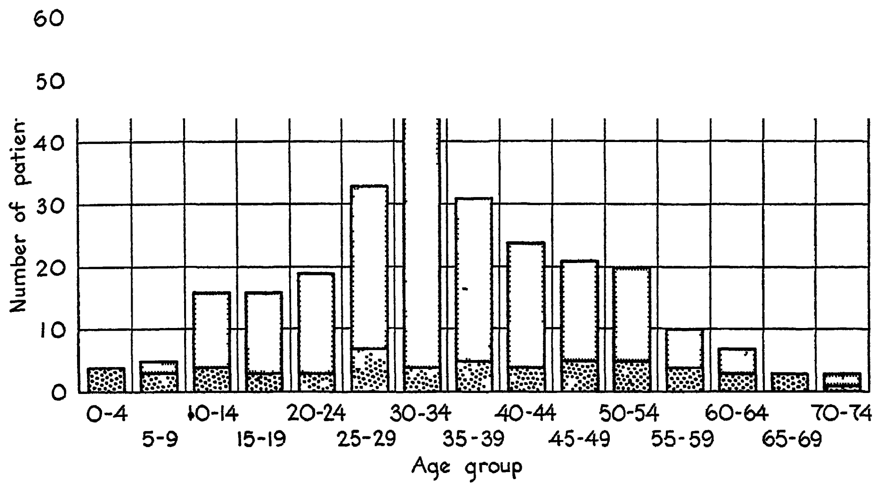

Figure 1.

Comparison of 253 Culturally Proven Cases of Brucellosis With and Without Farm Animal Contact

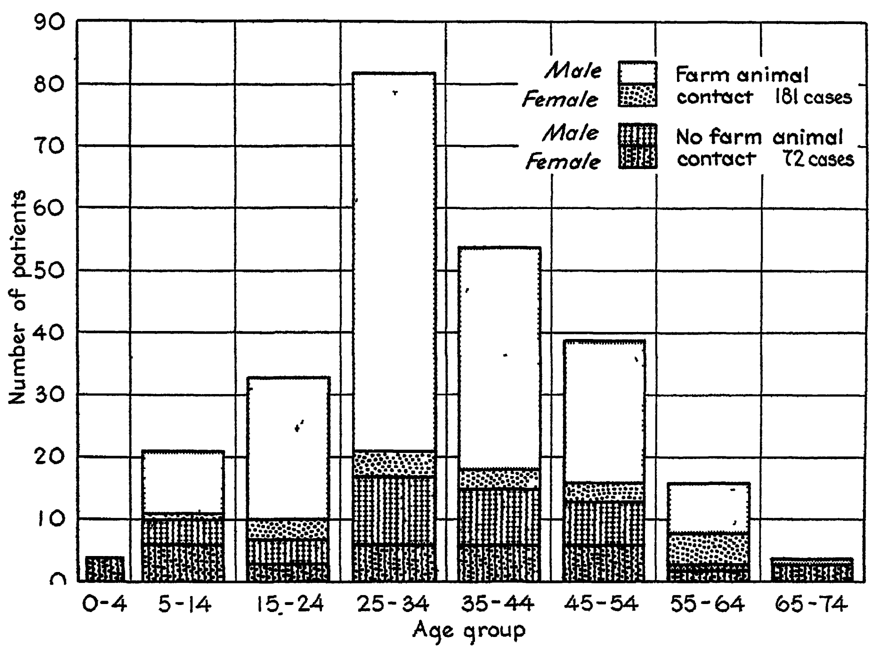

Figure 2.

Occupation and Residence

At least 60 percent of the proved cases in this study may be classified as occupational in origin. Farmers constituted the largest single group, followed by meat-packing plant employees (table 4). Retail butchers, stockyard workers, veterinarians, and laboratory workers were also involved. Of all cases reported to the Minnesota Department of Health through 1947, approximately one-third were farmers or farm workers and one-sixth were meat-packing plant employees.

Table 4. *Analysis of 255 proved cases according to residence and occupational groups in Minnesota (January 1945 to June 30, 1948)*

Occupational group	*Br. abortus*	*Br. melitensis*	*Br. suis*	Total	Percent
Urban:					
Business, trades, workers (male)	32	0	1	33	12.94
Packing plant, stockyards, butchers	30	15	9	54	21.17
Veterinarians	2	0	0	2	.78
Housewives, teachers, clerks (female)	20	0	0	20	7.85
Laboratory workers	0	2	0	2	.78
Children under 15	9	0	0	9	3.53
Total urban cases	93	17	10	120	47.05
Rural:					
Farmers, farm workers	91	4	2	97	38.04
Farm women	20	0	2	22	8.62
Farm children	15	1	0	16	6.28
Total rural cases	126	5	4	135	52.94
Total all cases	219	22	14	255	99.99

Accurate figures for the calculation of specific rates of infections in occupations are not available, but if the proportion of these occupational groups to the entire population is considered, it is evident that the rate of infection is far greater in packing-plant workers than in any other occupation. Jordan (*69*) recently reported the specific rates in Iowa (per 100,000 population) as follows: packing-house workers, 271.5; veterinarians, 250.0; farmers and farm workers, 43.0; urban merchants, trades, professions, 3.3; farm wives, 2.2; and urban housewives, 1.4.

In this study, only patients living on farms were classified as rural residents. Those living in villages and towns, or cities, were classified as urban. Of 120 cases among urban residents, 93, or 77.5 percent, of the infections were due to *Br. abortus*. *Brucella melitensis* caused 15 infections in meat-packing plant employees and 2 in laboratory workers. Of the 10 urban infections due to *Br. suis*, 9 occurred in packing plant employees. It is significant, then, that if occupational contacts are excluded, brucellosis in urban areas was due to *Br. abortus* with a single exception. Turning to the 135 rural cases, 126, or 93.3 percent, were due to *Br. abortus*. It is remarkable that among farm residents only five cases were caused by *Br. melitensis* and four by *Br. suis*, although over half of the farmers gave a history of contact

with swine and many were residents of southern Minnesota living only a few miles from Iowa where *Br. suis* is the predominant organism.

Source of Infection

The relative importance of various sources of infection as they appear in Minnesota is indicated in table 5, which summarizes the probable origin of infection in 255 cases. It is significant that 181, or 71 percent, gave a history of contact with farm animals or their carcasses. This group, composed mainly of adult males under the

Table 5. *Analysis of 255 proved cases according to probable sources of infection in Minnesota (January 1945 to June 30, 1948)*

Possible source of infection	*Br. abortus*		*Br. melitensis*		*Br. suis*		Total		Percent
	Male	Female	Male	Female	Male	Female	Male	Female	
Contact with cattle (and hogs) plus use of raw milk	96	16	[1]5	......	[1]2	[2]2	103	18	47.45
Contact with hogs only plus use of raw milk	......	......	2	......	......	......	2	0	.78
Contact with hogs only	3	......	8	......	4	......	15	0	5.86
Contact with cattle only	11	......	......	......	1	......	12	0	4.71
Contact with cattle and hogs	12	......	4	......	1	......	17	0	6.66
Packing employees—no known animal contacts	8	2	1	......	3	......	12	2	5.49
Total cases with animal contacts	130	18	20	0	11	2	161	20	70.95
Raw milk and/or cream	32	30	......	......	1	......	33	30	24.72
Laboratory infections	......	......	1	1	......	......	1	1	.78
Source unknown	4	5	......	......	......	......	4	5	3.54
Total cases with no animal contacts	36	35	1	1	1	0	38	36	29.04
Total	166	53	21	1	12	2	199	56	99.99

[1] Contact with cattle and hogs.
[2] Only animal contacts were cattle.

age of 55, dominated the age and sex distribution of the entire series. In Iowa over 70 percent of the reported cases had direct contact with livestock or fresh meat. Thus, a marked disparity is seen in the incidence of brucellosis in individuals and occupation groups who handle infectious materials as compared with a much larger population group ingesting raw milk. The conclusion appears justified that direct contact with infected animals and tissues is much more likely to result in illness than is the ingestion of the organisms in raw milk.

The data in table 5 also indicate that there was a fairly consistent correlation of the source of infection with the species of *Brucella* isolated. The largest single group, consisting primarily of rural residents, were patients who had had contact with cattle (frequently also with swine) and who drank raw milk. In this group, 112 out of 121 cases were due to *Br. abortus*. The herds of cattle of 68 farmers in this group showed evidence of Bang's disease as indicated by the occurrence of abortions or positive reactors to the agglutination test. Thirty-four of these farmers and one farm wife had handled aborted material. Five rural males, one a 10-year-old farm boy, developed

melitensis infection. These five had contact with hogs as well as with cattle, and abortions had occurred in the swine herds on four of the farms.

Br. suis was isolated from four patients in the group who had animal contact and drank raw milk. Two were farmers having contact with swine and cattle. The other two cases were farm women whose only animal contact was with milch cows. The suspected cows in each instance were found to be positive reactors. In these two cases, *Br. suis* was apparently transmitted from infected cows either by direct contact or through the milk. It is of interest that in one case, the husband and a 16-year-old son also had symptoms of brucellosis and agglutinin titers of 1:1280, although blood cultures remained sterile. This family had a single milch cow, subsequently proved to be a positive reactor, whose milk was used only by the family. The entire family had had contact with the animal in milking. The other patient with *suis* infection from a bovine source had a brother who developed an agglutinin titer of 1:320, but manifested no symptoms.

Also included in the group of patients having animal contact and using raw milk were two packing-plant employees with *melitensis* infection. The activities of both were confined to the "hog-kill" division. Neither had had contact with sheep or goats.

A second category of patients includes those having contact with animals or fresh meat products and who denied the use of raw milk. Meat-packing plant employees comprised the majority of this group, although several farmers who denied the use of raw milk or cream were also included. Two veterinarians, two stockyard employees, and a retail butcher brought the total to 56 cases, of whom only two were females. Among the packing-plant employees included in this group were 14 whose work did not involve the handling of live or freshly slaughtered animals. These included such employees as a typist in the general office, steamfitter, pipeshop worker, millwright, carpenter, elevator operator, and a bacon slicer. Because of the possibility of inadvertent contact with infected animals or tissues, they have been tabulated with the animal contact group.

In a number of cases the strain of *Brucella* isolated was not the species that would have been expected from the apparent source. *Br. abortus* was isolated from 3 workers having contact only with slaughtered hogs and from 10 of the workers just discussed who had no definite animal contact. The remaining 22 patients in this category with *abortus* infection, including one retail butcher, had had contact with fresh beef. A consistent correlation between *melitensis* infection and contact with hogs was found, except for one patient who was an elevator operator in a packing plant. A striking feature was that 13 of the 15 cases of *melitensis* infections occurring in meat-packing plant workers were detected in one particular plant. The

appearance of swine-borne *melitensis* infection in Minnesota has been observed only in the past 3 years, following the discovery of *melitensis* infection in hogs in Iowa. *Br. suis* was isolated from one patient who worked on the beef-kill and from three packing-plant employees with no known animal contacts.

A third major group of the proved cases consisted of those who had ingested raw milk or cream without any other known exposure to possible infectious sources. There were 63 patients in this group, 30 of whom were females. Only 11 individuals in this group resided on farms and these were women and children. The remainder were urban residents engaged in various occupations, including salesmen, mechanics, merchants, housewives, and students. The causative organism in this group was *Br. abortus* with the single exception of a mechanic from whom *Br. suis* was isolated. The source of the raw milk used by this patient was unknown. The 11 rural patients drank raw milk obtained from their own herds; in 7 of these there was evidence of Bang's disease. Among the 52 urban cases, 20 obtained raw milk directly from friends or relatives on farms. Data on these herds were fragmentary, but evidence of Bang's disease was present in at least five instances. The remaining 32 patients obtained their milk through regular commercial channels. One commercial dairy herd from which two of the patients had obtained milk was shown to contain two animals suspected of having Bang's disease on the basis of agglutination tests.

The degree of exposure to potentially contaminated milk varied widely. Most of the rural patients used raw milk and cream regularly although two farm women stated that they had used only raw cream for coffee and cereal. Five patients were rural children from 2 to 6 years of age. One, a 2-year-old girl, had no symptoms or fever, but *Br. abortus* was isolated from her blood when submitted for culture along with other members of the family who were ill. Eight urban residents who usually drank pasteurized milk developed illness following vacations or brief visits on farms. Several other urban cases were salesmen and truck drivers who drank only milk served across the counter in cafes in small towns or villages. Other urban residents had habitually used raw milk for years before the onset of the illness.

From the public health viewpoint, the cases in which raw milk was the only demonstrable source are perhaps the most important group. These cases, representing 25 percent of the proved cases in the present study, could probably have been avoided if the universal pasteurization of milk had been in force. It is estimated that in 1947 less than 10 percent of the population of Minnesota lived within the confines of municipalities in which the sale of raw milk was forbidden (*64*). The two largest cities, with a combined population of over 800,000

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do not have such an ordinance, although most of the milk is pasteurized. Studies of Fitch and Bishop (*30, 70, 71*) have demonstrated the presence of viable *Brucella* in raw market milk in Minnesota, including that from certified herds.

One must conclude that thousands of individuals are repeatedly exposed to viable *Brucella* in raw milk without any subsequent evidence, clinical or laboratory, of such exposure. Others apparently develop serum agglutinins and dermal sensitivity to *Brucella* antigens, without clinical manifestations of infection. A recent survey of 1,627 healthy donors of the blood bank at the university hospitals revealed an agglutinin titer of 1:20 or above in 12.2 percent as compared with a reported case rate of approximately .012 percent in this State. On the other hand, it is apparent that some individuals develop clinical illness and bacteremia after an occasional or repeated exposure to the organisms in milk.

A small group of patients who had no contact with animals and had not to their knowledge used any raw milk have been classified as "source unknown." Since contact with animals was definitely ruled out, it appears likely that these infections developed from the use of raw milk or milk products. It may be significant that one of these patients frequently ate raw hamburger.

Geographical Distribution

The geographical distribution of the proved cases of brucellosis in Minnesota according to county of residence is shown in figure 3. In 1948, 21 counties, operating under the area plan for control of Bang's disease, were accredited and 8 counties were in the process of accreditation as modified accredited Bang's disease-free areas. These 29 counties represent more than half of the area of Minnesota, but they contain only one-fifth of the cattle and approximately 23 percent of the population.

The direct influence on human health of control measures against bovine brucellosis is revealed by data from the 21 counties under the area plan. In 1939, before this program was well established, the 21 counties, which have subsequently become accredited, contributed 13 percent of the reported cases of human brucellosis in the State. In 1946, with bovine infection in these counties reduced to less than 1 percent, they represented only 3.7 percent of the human cases reported in the State (*72*). Analysis of the annual infection rate of human brucellosis, based on reported cases per 100,000 population, discloses that since 1937 there has been a fourfold increase in the rate from counties outside the area plan, whereas there has been no increase in the infection rate during the same period in the controlled area.

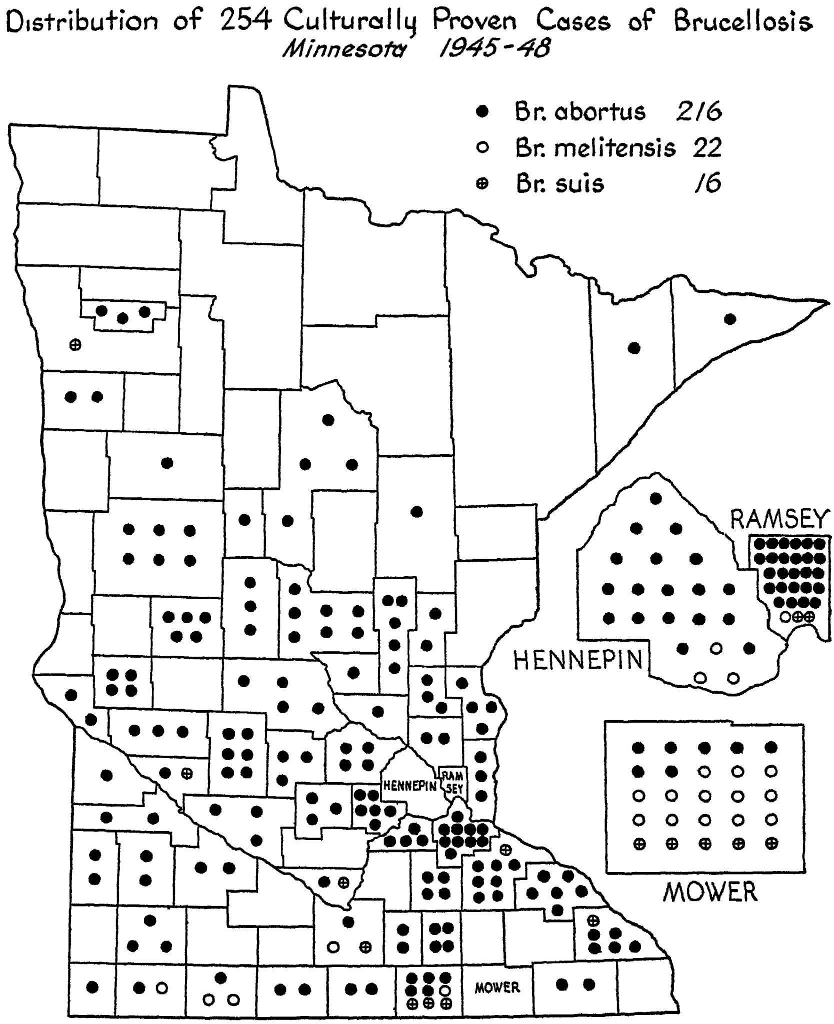

Figure 3.

Approximately 90 percent of the proved cases in this study were residents of nonarea counties. Counties containing the large meat-packing plants showed the greatest number of cases.

Seasonal Incidence

A marked variation in seasonal incidence was not observed in the proved cases in this study. March was most frequently listed as the month of onset. A relatively high rate of onset persisted through July, falling off in late summer and fall. Approximately 60 percent

of the patients noted the onset of symptoms between March and August; 40 percent from September through February. Most previous data have shown the highest incidence to be in the summer quarter. In this study, the incidence in the spring quarter was slightly greater.

Laboratory Studies

The laboratory findings in the cases comprising this study are of considerable interest. *Br. abortus* was isolated from the spinal fluid of two patients with symptoms of meningo-encephalitis, whereas repeated blood cultures showed no growth. Cultures of the sternal bone marrow revealed *Br. abortus* in two patients; in one of these, blood cultures were sterile. In the remaining 264 cases, the final diagnosis was confirmed by isolation of *Brucella* from the blood.

The duration of symptoms at the time the organism was first isolated is summarized in table 6. Among the 251 cases from which

Table 6. *Duration of symptoms at time of first positive culture, based on 251 cases*

Species	Under 15 days	15–30 days	31–60 days	61–90 days	3–6 months	7–12 months	1–2 years	Total under 3 months	Total over 3 months
Brucella abortus	20	51	68	36	26	11	7	175	44
Brucella melitensis	4	9	2	3	1	0	0	18	1
Brucella suis	2	3	4	3	1	0	0	12	1
Total cases	26	63	74	42	28	11	7	205	4

this information was obtained, 205 had noticed symptoms for less than 3 months. Twenty-eight patients had been ill for 3 to 6 months, and seven had symptoms for a year or longer at the time of the first positive blood culture. In the majority of cases, only one or two blood samples were submitted, and the duration of symptoms before isolation of the organism represents the delay in sending the blood for examination. In several instances, however, one or more negative cultures were obtained before ultimate isolation.

Agglutinin Titers

The serum agglutinins against *Brucella* antigen were determined, with one exception, in every proved case. The agglutination test employed was a macroscopic tube method, using serum dilutions 1:20 through 1:5120. Five-tenths milliliter of antigen suspension supplied by the Bureau of Animal Industry, United States Department of Agriculture, was added to 0.5 milliliter of serum dilution and incubated at 37° C. for 16 to 18 hours followed by 1 hour at approximately 4° C.

The results of the agglutination tests are shown in figure 4. In the great majority, blood samples for culture and agglutinin determi-

nation were submitted at the same time or within a few days. In 10 cases, the interval was over 30 days. A single patient failed to show serum agglutinins at the time his blood culture was found to be positive. This patient was a 37-year-old veterinarian in whom two previous agglutinin determinations, 4 months and 7 months before, had revealed incomplete agglutination at a dilution of 1:160. Unfortunately further determinations were not obtained. Seven patients had atypical or incomplete agglutination in dilutions of 1:80 to 1:320.

Agglutination Titers of 267 Culturally Proven Cases of Brucellosis

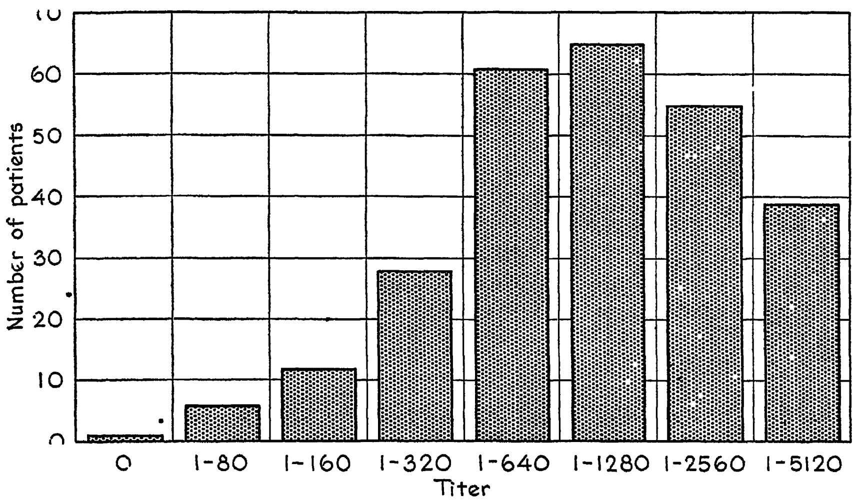

Figure 4.

The remaining 258 cases had complete agglutination in a titer of 1:80 or above. Over 90 percent had titers of 1:320 or above. It is of interest that 3 patients with partial agglutination and 3 with a titer of 1:80 developed complete agglutination at titers of 1:160 or above on subsequent tests carried out within 30 days. It appears probable that agglutinins would have been found in the case of the veterinarian cited above had subsequent studies been made.

The absence of agglutinins in the serum of only one patient in this series of 268 cases having positive cultures is not in agreement with the results of some workers who state that a significant number of patients having positive blood cultures have no demonstrable agglutinins. There may be several reasons for the discrepancy between the data presented here and the findings of others. Important considerations are the method used for carrying out the agglutination test and the type of *Brucella* antigens employed. In these laboratories, the macroscopic tube agglutination technique has proved to be

more reliable than the rapid-slide method. Considerable variation in results has been obtained with different *Brucella* antigens. In an occasional patient, there is apparently a fluctuation in the titer of agglutinins, and repeated tests should be performed at appropriate intervals before stating that agglutinins are persistently absent. Less commonly, "blocking" antibodies in some sera may inhibit the clumping of antigen when the usual methods of performing the agglutination test are used (*73*). Occasionally, sera show the presence of a prozone phenomenon in which agglutination does not occur in the lower dilutions of sera.

The agglutination of organisms of the *Pasteurella* group by serum from patients with brucellosis has been reported by several workers (*74*, *75*), but the presence of a true common antigen shared by these organisms remains in doubt. Wilson (*76*) and others were unable to detect any antigenic relationship between them. In the present study, the agglutination test for *P. tularense* was carried out concurrently with the test for *Brucella* in 55 cases. Agglutinins for tularemia were positive in a titer of 1:40 or above in eight, or 14.5 percent, of the cases tested. In none of these eight cases was the agglutinin titer for *Brucella* under 1:640, and 5 had titers of 1:5120. Of these 5 patients, one had a titer of 1:320 for *P. tularense;* 3 had titers of 1:160; and one a titer of 1:80.

Summary and Conclusions

Available evidence reveals a sharp increase in both human and bovine brucellosis in Minnesota since the period before World War II. An analysis of the data on 268 human cases demonstrates that *Br. abortus* is the causative organism in about 85 percent of the cases. The remaining infections, divided almost equally between *Br. suis* and *Br. melitensis,* occur chiefly in meat-packing plant employees handling infected swine, though a few cases have occurred in farmers. Several cases of *Br. suis* infection transmitted through cattle are also cited.

Approximately half of all cases occur in individuals whose occupation involves contact with livestock or slaughtered animals, and nearly three-fourths have some contact with farm animals. Adult males between the ages of 20 and 55 comprise the bulk of this group. Raw milk provides the sole source of infection in about one-fourth of all cases. These cases are equally divided between males and females and are distributed more equally through all ages than are the cases with animal contact. These observations suggest that infection occurs more readily through the skin from handling infectious materials than by invasion through the gastro-intestinal tract following ingestion of contaminated milk.

Laboratory data on 267 cases indicates that the agglutinin test is a highly reliable diagnostic aid in active brucellosis. A negative agglutination test in the presence of a positive blood culture was found in a single case.

Prevention of the human disease is dependent upon eradication of the disease in animals. Pasteurization of all milk would prevent infection in many cases, but there appear to be few practical ways of protecting farmers, packing plant workers, veterinarians and others who work with infectious animals. Control measures for bovine brucellosis have proved effective, especially when conducted over a large area, but shortages of personnel have limited the extension of effective area control into the areas having the greatest number of cattle and highest rates of infection. The ultimate control of brucellosis and removal of the menace it holds for the health and economic welfare of large numbers of the population of agricultural States is an important public health problem.

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Relation of Human and Bovine Brucellosis in Minnesota

By D. S. FLEMING, M. D., M. P. H., and M. H. ROEPKE, Ph. D.*

Human cases of brucellosis have been reported in Minnesota since 1927, with an especially marked increase in the last decade (table 1). Bovine brucellosis has long been recognized in Minnesota and causes serious economic losses to livestock owners. Costs to the State for organized Bang's disease control measures from 1934 until August 1947 were $1,403,588.47, covering indemnity and operating expenses (*1*). Concurrent Federal expenditures for this same purpose were approximately the same.

Table 1. *Undulant fever, Minnesota, 1927–48*

Year	Cases	Deaths	Year	Cases	Deaths
1927	6	----------	1938	85	----------
1928	12	----------	1939	92	3
1929	42	----------	1940	137	3
1930	62	----------	1941	177	1
1931	72	2	1942	260	1
1932	62	3	1943	326	1
1933	72	----------	1944	395	----------
1934	102	1	1945	352	1
1935	114	3	1946	403	1
1936	77	2	1947	378	----------
1937	89	5	1948	303	----------

The Minnesota program for the control of bovine brucellosis has recognized that no one method has been effective under all conditions, but has emphasized the test and slaughter principle of removing sources of infection. Since 1934, the area plan and the certified herd plan of control have been based on this fundamental and, with proper sanitation, have been the main programs in Minnesota aimed at controlling bovine brucellosis.

This report analyzes the relation of human brucellosis to the area plan of controlling bovine brucellosis. The area plan is based upon counties, and requires 67 percent of the cattle owners in the county to sign a petition requesting the program before it is put into effect. Once adopted, the plan requires the blood-testing of all cattle in the county at State and Federal expense. Reactors disclosed must be sold for slaughter within 15 days (indemnity paid), or isolated from all other cattle until sold for slaughter (no indemnity if held over 15 days), or the entire herd, including infected animals, must be maintained in quarantine, with calf vaccination required (no indemnity).

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Importations are restricted to cattle originating in a modified accredited Bang's disease free area, or in certified Bang's disease free herds, or to cattle which have been tested and found free of Bang's disease within 30 days prior to importation, and are quarantined for retest 30 to 60 days following importation. All herds with reactors are quarantined until retested and found negative All infected herds are retested at intervals until they have passed three consecutive negative tests. Vaccination of calves and adults may be employed in various ways.

The first tests in Minnesota under the area plan were made in November 1939 By August 1, 1947, 21 counties in Minnesota were certified on the basis of the area control plan as modified accredited Bang's disease free. By definition, this means 5 percent or less of herds infected, and 1 percent or less of cattle infected On May 1,

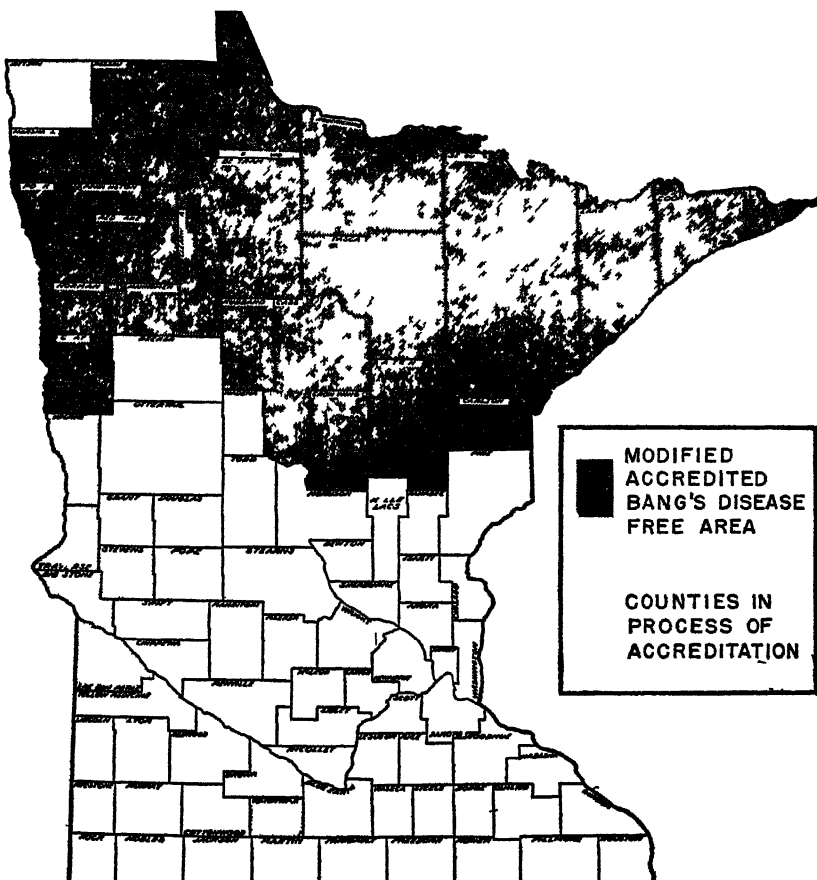

Figure 1. Minnesota counties in area plan of control, August 1947.

1949, seven additional counties were in the process of accreditation, and three counties were awaiting the initial tests (fig. 1). This represents a total of 31 of the 87 counties in the State supervised under the area plan and comprises slightly more than half of the area of the State, approximately one-third of the herds, and one-fourth of the cattle in the State. Of the 21 accredited counties, six were officially accredited in 1940, seven in 1941, five in 1942, two in 1943, and one in 1944.

This study compares the incidence of human brucellosis during the years 1937–47 in the group of 21 counties accredited under the area plan of control with similar figures in a second group of counties bordering the area counties, and a third group of counties in the remainder of the State. The counties comprising each of these three districts are shown in figure 2. Only the 21 accredited counties are included in district 1. The seven counties in process of accreditation

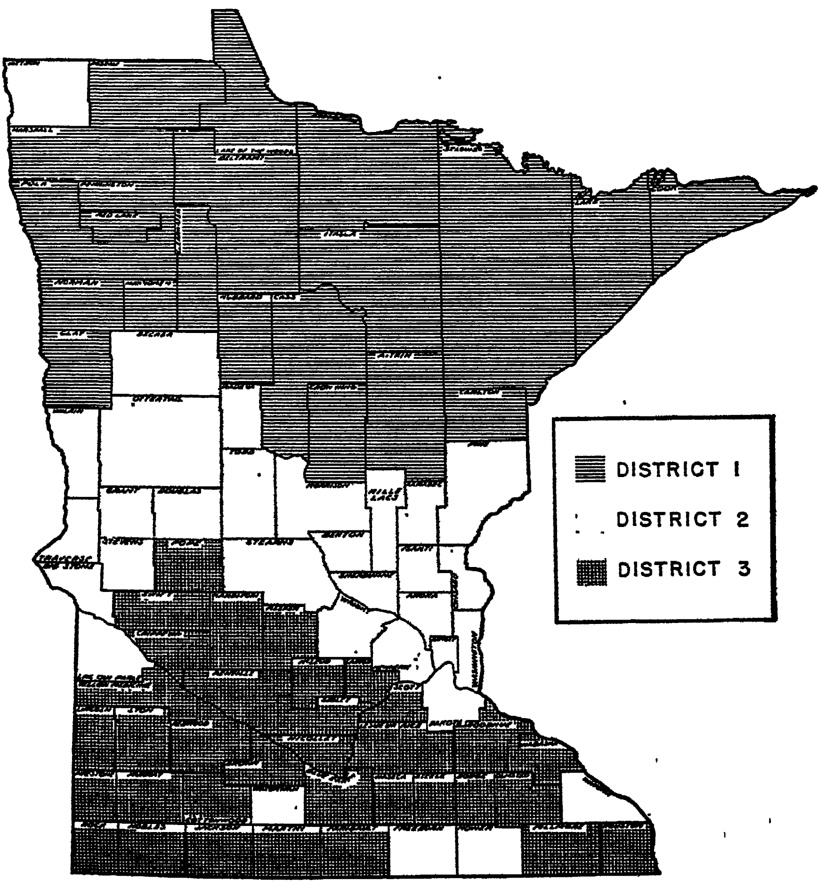

Figure 2. Minnesota counties comprising districts 1, 2, and 3.

are not included in any of the districts. The counties of district 2 were selected for their similarity to district 1 in all farm practices except that of area brucellosis control. District 3 includes the remainder of the State, with important exceptions. Hennepin and Ramsey Counties are not included because of the excessive influence on rates of human infection of the populations of these two counties, which include the two largest cities in the State, Minneapolis and St. Paul, with a combined population of 780,106 (1940 census). In addition, many packing plant cases live in these cities. Washington, Dakota, Winona, Mower, and Freeborn Counties are not included in district 3 because the meat packing plants located in each of these counties contribute a relatively large number of human cases which again would have an excessive influence on rates of infection related to the bovine control program.

Table 2. *Undulant fever in Minnesota, 1937–47, by districts*

District	Population (1940)	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947
1	553,762	10	11	11	8	5	12	14	16	15	17	16
2	394,150	10	9	7	25	17	35	62	81	65	100	75
3	713,404	35	30	42	64	75	96	126	164	134	156	141
		Rate per 100,000 population										
1		1.8	1 9	1 9	1 4	0 9	2 1	2 5	2 8	2 7	3 0	2 8
2		2 5	2.2	1 7	6 3	4 3	8 8	15 7	20 5	16 4	25 3	19 0
3		4 9	4.2	5.8	8 9	10 5	13 4	17 6	23 0	18 7	21 8	19.7

Table 2 indicates for each district the population (1940 census), the number of human cases of brucellosis reported to the State Health Department during 1937–1947, and the rate of cases per 100,000 population annually (*2*). These rates, charted in figure 3, show that no appreciable increase in human brucellosis occurred in district 1 in the period 1937–1947, but that rates of human infection in the other districts increased four- to ten-fold in the same period. The increase in human infection rate is almost identical in the counties of district 2, immediately adjoining district 1, and in the counties of the southern portion of the State. These increases appear to have begun in 1938 to 1939. Apparently, the factors responsible for the increase in human disease operated to the same relative degree in those counties bordering the area controlled counties and in the southern counties. This is important because it has previously been claimed that the northern counties differed to such an extent from the southern, in terms of concentration of cattle and emphasis on livestock farming, that this factor alone accounted for the lower incidence of human brucellosis in the north. It is true that the total number of cattle is far greater in the south district, but dairying with its attendant close

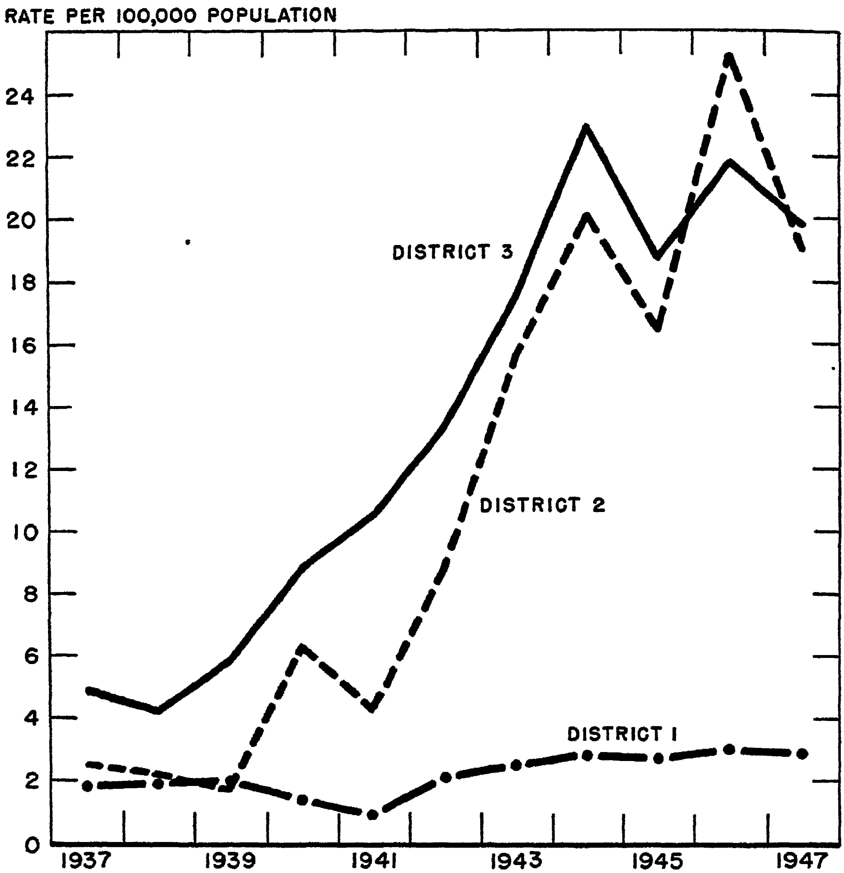

Figure 3. Undulant fever in Minnesota by districts, 1937–47.

exposure is very generally practiced in the north. It would seem that, as concerns the factors influencing human brucellosis at least, the northern counties, as typified by district 2, differ hardly at all from the southern counties. The marked difference in human infection rates in district 1 as compared to district 2 is therefore of greater interest. Farming practices and general conditions are fairly similar in the two districts except that bovine brucellosis has been controlled under the area plan in district 1 throughout this period of years, and not in district 2.

Another frequently mentioned explanation for the observed increase in human brucellosis in recent years has been the great increase in numbers of cattle and dairy products produced during the war years together with attendant difficulty in maintaining usual control measures. These factors have been felt to be of relatively greater importance in the southern counties of Minnesota than in the north. To

Table 3. *Cows and heifers, 2 years old and older, kept for milk in districts 1, 2 and 3, 1937–47*

District	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947
1	266, 500	271, 500	265, 500	270, 500	272, 500	280, 500	291, 500	309, 000	292, 500	264, 000	246, 700
2	411, 300	431, 500	440, 500	442, 500	453, 700	478, 500	488, 500	506, 500	503, 000	489, 500	482, 700
3	746, 500	761, 000	755, 500	765, 000	778, 500	793, 500	804, 500	817, 000	780, 000	751, 500	748, 900

Ratio between minimum and maximum year's cattle population:
District 1—1:1.25 (1947 and 1944).
District 2—1:1.23 (1937 and 1944).
District 3—1:1.09 (1937 and 1944).

examine this aspect, studies were made of the numbers of cows and heifers 2 years old and older kept for milk in each of districts 1, 2, and 3, for the years 1937–47. These figures are available as yearly estimates in the bulletins of the Minnesota State Department of Agriculture, Dairy and Food (*3*). The figures appear in table 3 and figure 4. In the graph the curves are superimposed by using different values on the vertical scale in order to illustrate the com-

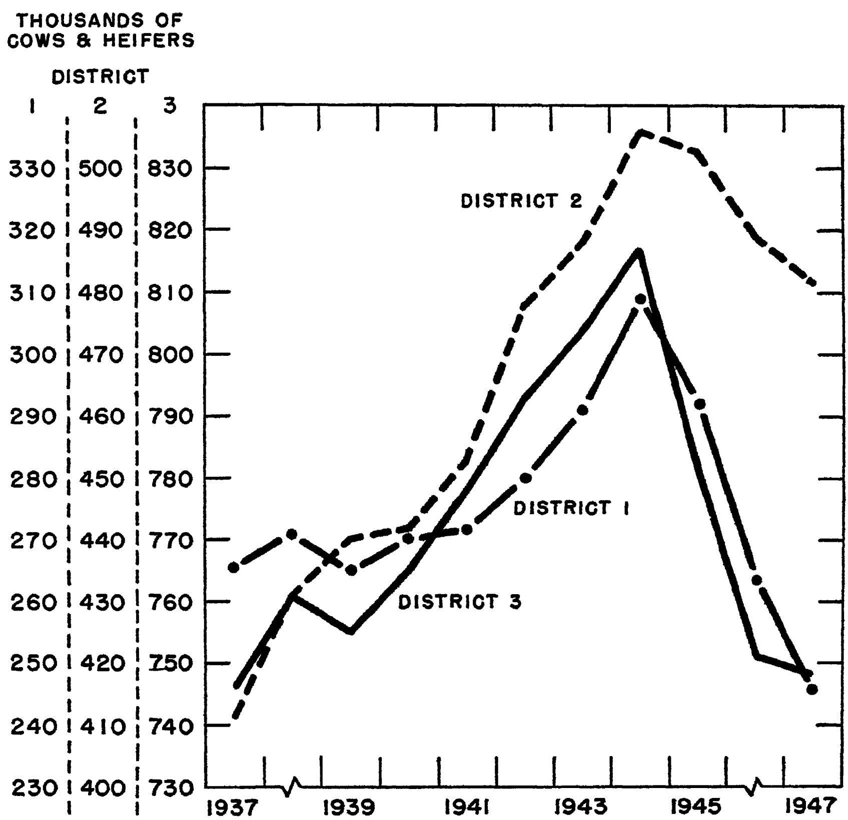

Figure 4. Number of cows and heifers 2 years old and older kept for milk in districts 1, 2, and 3, 1937–47.

parative trends. It is apparent that the same relative increase in livestock during the war years occurred in all districts; districts 1 and 3 are especially alike. This same trend is illustrated by comparing the ratio of the minimum annual cattle population with the maximum for each district during this period. Thus, in district 1 there is a ratio of 1 to 1.26 between the minimum of 1947 and the year of greatest cattle population, 1944. In district 2 this ratio is 1 to 1.23, and in district 3, the ratio is 1 to 1.09. We see that the relative increase in cattle concentration during the war period was greatest in the northern counties. If this was truly a factor in the increase in human brucellosis, it should have had the least effect in district 3, the southern counties. As the annual human infection rates for each district show, however, the opposite occurred.

Another experience confirming the value of the area control program is the comparison of rates of human infection for Watonwan County with the four bordering counties. Watonwan County in the southern part of the State has been in process of accreditation for nearly 8 years. Until recently it has not been possible by a regular program of testing to reduce bovine infection below the limits set by law for accreditation. This has been due in large measure to reinfection from surrounding counties, retention of infected animals in appreciable numbers of herds, and a high rate of change of tenants on farms. For the 5-year period 1943–47, inclusive, the average number of undulant fever cases reported per year per 100,000 population in Watonwan County was 4.3. The rates for the same period in the four bordering counties were: Cottonwood County, 14.9; Brown County, 11.7; Blue Earth County, 7.7; and Martin County, 24.3. Average for the four border counties was 13.8.

The practical difficulties of conducting an area control program, especially the procurement of sufficient trained personnel to blood-test large numbers of livestock, have limited its extension to the remainder of the State. However, new techniques for screening infected herds, based on herd milk or cream ring tests, may soon make area control work considerably easier. The present difficulties should not be advanced as valid reasons for discontinuing area control work and should not obscure the very real benefits to public health procured by the virtual elimination of bovine brucellosis in the controlled area.

Summary

1. During the period 1937–47, the reported rate of human brucellosis has increased 4 to 10 times in districts of Minnesota not under the area plan of bovine brucellosis control. No appreciable increase occurred in a district of 21 counties under the area plan.

2. During the same period, fluctuations in the cattle population occurred in similar proportions in all these districts.

3. The area plan of bovine brucellosis control in Minnesota appears to produce considerable benefit to the public's health.

REFERENCES

(1) Bang's Disease Control Program in Minnesota. Publication No. 2. November 1947, Minnesota Legislative Research Committee.

(2) Records of Minnesota Department of Health.

(3) Minnesota Agricultural Statistics, 1937–47. Minnesota Department of Agriculture, Dairy and Food.

Symposium on Brucellosis

A symposium on brucellosis will be held September 22 and 23, 1949, at the National Institutes of Health, Bethesda, Md. All sessions will meet in Wilson Hall, Administration Building. The veterinary, public health, clinical, bacteriological, and control aspects of the disease will be discussed. The Symposium is being sponsored by the Bureau of Animal Industry, the National Research Council, and the National Institutes of Health. Inquiries should be addressed to Dr. James T. Culbertson, Executive Secretary, Microbiology and Immunology Study Section, National Institutes of Health, Bethesda, Md.

List of Subjects and Speakers

1. The History of Brucellosis—Dr. Alice C. Evans, Chevy Chase, Md.
2. Brucellosis in Cattle—Dr. Chester Manthei, Animal Disease Station, Bureau of Animal Industry.
3. Brucellosis in Swine—Dr. L. M. Hutchings, Department of Veterinary Medicine, Purdue University.
4. Brucellosis in Animals and other than Cattle or Swine—Dr. W. L. Boyd, School of Veterinary Medicine, University of Minnesota.
5. The Control of Brucellosis in Animals Employing Test and Slaughter Methods—Dr. H. L. Gilman, Professor of Veterinary Research, Veterinary College, Cornell University.
6. The Control of Brucellosis in Animals by the Use of Vaccine—Dr Jacob Traun, Department of Veterinary Science, University of California.
7. Federal Aspects of Control of Brucellosis in Domestic Animals—Dr. B. T. Simms, Chief, Bureau of Animal Industry, United States Department of Agriculture.
8. The Chemistry of Brucella Organisms—Dr. Robert Pennell, Research Division, Sharpe & Dohme, Inc.
9. Variation in the Genus Brucella—Dr. Werner Braun, Camp Detrick, Frederick, Md.
10. The Physiology of Brucella Organisms—Dr. B. H. Hoyer, Laboratory of Infectious Diseases, National Institutes of Health.

11. Immunology of Brucellosis—Dr. Sanford Elberg, Department of Bacteriology, University of California.
*12. Clinical Aspects of Brucellosis in Man—Dr. W. W. Spink, Department of Medicine, University of Minnesota.
*13. Therapy of Brucellosis in Man—Dr. Wesley Eisele, Department of Medicine, University of Chicago.
14. Bactericidal Tests in Brucellosis—Dr. M. R. Irwin, Department of Bacteriology, University of Wisconsin.
15. The Pathology and Pathogenesis of Brucellosis—Dr. A. I. Braudie, Department of Medicine, University of Minnesota.
16. The Epidemiology of Human Brucellosis—Dr. Carl Jordan, Director, Tarrant County, Health Department, Fort Worth, Tex.
17. Brucellosis in Canada—Representative, Animal Disease Research Institution, Department of Agriculture, Hull, Quebec, Canada.
18. Brucellosis in Puerto Rico—Dr. Pablo Morales-Otero, Santurce, P. R.
19. The Epidemiology of Brucellosis in Indiana—Dr. Raymond Fagan, School of Public Health, Harvard Medical School.
20. Brucellosis as Viewed by a Rural Practitioner—Dr. M. Anderson, Federalsburg, Md.
21. Brucellosis as an Industrial Problem—Dr. R. Newton, Director of Research, Swift & Co.
22. The Laboratory Diagnosis of Brucellosis—Dr. Norman McCullough, Surgeon, Public Health Service, Department of Medicine, University of Chicago.
23. Chemotherapy of Brucellosis in Experimental Animals—Dr. B. N. Carle, Laboratory of Infectious Diseases, National Institutes of Health.
24. A Summary of the Present Knowledge of Brucellosis—Dr. K. F. Meyer, Hooper Foundation, University of California.

(Printed programs will be available in advance of the meeting)

* Papers for evening session, September 22.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 30, 1949

A total of 1,962 cases of poliomyelitis was reported, as compared with 1,444 last week (an increase of 36 percent), 1,213 for the corresponding week last year (representing an increase of 24 percent) and 740 for the 5-year (1944–48) median. Reports from the Middle Atlantic and North Central areas accounted for 501 of the net increase of 518 cases, as follows (last week's figures in parentheses): Middle Atlantic 244 (143), East North Central 489 (308), West North Central 509 (290). Current figures for 35 States reporting more than 7 cases each (7 of which showed a combined decline of 45 cases) showed a net increase of 547 cases. Figures for 23 States reporting more than 18 cases each are as follows (last week's figures in parentheses): *Increases*—Massachusetts 33 (31), New York 200 (116), New Jersey 27 (21), Ohio 65 (38), Illinois 145 (75), Michigan 149 (82), Wisconsin 47 (29), Minnesota 91 (79), Iowa 83 (45), Missouri 194 (73), South Dakota 32 (6), Kansas 68 (45), West Virginia 24 (21), Kentucky 47 (41), Tennessee 48 (40), Oklahoma 96 (80), Texas 95 (89), Idaho 30 (16), Colorado 21 (16), California 87 (80); *decreases*—Indiana 83 (84), Nebraska 23 (25), Arkansas 73 (91). A total of 7,375 cases has been reported since March 19 (average week of seasonal low incidence), as compared with 5,443 for the same period last year and a 5-year median of 2,797.

Two human cases of plague have been reported in New Mexico—one in Taos County with onset on July 29, and one in Sandoval County, date of onset not given.

Of 40 cases of Rocky Mountain spotted fever reported (last week 32, 5-year median 32), 31 occurred in 12 South Atlantic and South Central States, 3 in Colorado, and 1 each in New Jersey, Pennsylvania, Indiana, Iowa, Wyoming, and California.

Of 291 cases of typhoid and paratyphoid fever, California reported 184, of which 182 were paratyphoid fever.

Deaths recorded during the week in 94 large cities in the United States totaled 8,945, as compared with 8,233 last week, 8,338 and 8,504, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,338. The total for the year to date is 281,632, as compared with 283,670 for the corresponding period last year. Infant deaths during the week totaled 687, last week 577, same week last year 694, 3-year median 679. The cumulative figure is 19,429, same period last year 20,212.

Telegraphic case reports from State health officers for week ended July 30, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	-	-	-	14	-	4	15	-	3	-	-	3	8	-
New Hampshire	-	-	-	1	-	-	1	-	1	-	-	-	-	-
Vermont	-	-	-	17	-	-	1	-	-	-	-	-	1	-
Massachusetts	8	-	-	60	3	-	33	-	11	-	-	4	92	-
Rhode Island	-	-	-	3	-	-	-	-	-	-	-	-	-	-
Connecticut	2	-	-	70	-	15	14	-	2	-	-	3	33	-
MIDDLE ATLANTIC														
New York	4	1	(c)	223	2	104	200	-	[d] 20	-	-	7	185	13
New Jersey	-	-	-	136	-	43	27	1	7	-	-	2	71	(1)
Pennsylvania	2	-	(c)	177	3	-	17	1	9	-	-	6	111	1
EAST NORTH CENTRAL														
Ohio	1	-	3	167	3	37	65	-	21	-	-	11	111	7
Indiana	8	-	-	19	-	-	83	1	6	-	-	2	25	16
Illinois	3	3	-	103	2	45	145	-	8	-	-	4	127	1
Michigan [c]	1	2	-	109	2	30	149	-	24	-	-	2	105	1
Wisconsin	-	-	-	214	-	1	47	-	2	-	-	-	74	1
WEST NORTH CENTRAL														
Minnesota	1	-	-	7	-	3	91	-	2	-	-	-	1	-
Iowa	-	2	-	12	1	-	83	1	1	-	-	-	16	7
Missouri	2	-	-	6	3	12	194	-	2	-	5	4	7	-
North Dakota	-	-	-	9	-	-	18	-	-	-	-	-	7	-
South Dakota	-	-	-	1	-	1	32	-	-	-	-	-	1	-
Nebraska	-	1	2	3	-	-	23	-	1	-	-	-	1	-
Kansas	-	-	-	4	-	5	68	-	4	-	-	1	8	-
SOUTH ATLANTIC														
Delaware	-	-	-	2	-	-	1	1	-	-	-	-	4	-
Maryland [c]	2	-	1	12	-	15	7	4	1	-	1	2	48	-
District of Columbia	-	-	-	19	-	18	1	1	-	-	-	1	2	-
Virginia	2	-	71	42	-	16	13	9	9	-	1	3	30	-
West Virginia	2	-	-	9	2	-	24	-	4	-	-	2	25	-
North Carolina	3	-	-	22	-	-	[1] 15	7	5	-	-	1	54	-
South Carolina	4	-	41	46	-	22	8	1	2	-	1	4	3	4
Georgia	6	-	4	24	3	5	9	1	2	-	1	10	4	5
Florida	4	-	-	12	1	5	7	-	3	-	1	-	3	-

EAST SOUTH CENTRAL														
Kentucky	4			6	2	24	47	1	5			6	30	14
Tennessee			21	13	2	27	48	3	5			2	38	
Alabama	6			12		10	16	1	2			2	12	5
Mississippi [a]	5			2	1	7	12						2	
WEST SOUTH CENTRAL														
Arkansas	2		13	9	1	12	[1] 73	1	3		10	3	33	4
Louisiana	1			1		14	6		3			6	3	
Oklahoma	1	1	7	5		13	96	1	1		3	3	20	2
Texas	12	1	198	65	11	189	95		8		1	8	110	11
MOUNTAIN														
Montana				43			1						2	
Idaho			3	20		5	30		[d] 3			2	2	
Wyoming	1			2			2	1						
Colorado		1	16	25	2	8	21	3	4			1	6	
New Mexico	[e]			23		11	5						2	
Arizona	1		16	16		5	8					2	1	1
Utah [a]				10	1	3	5						18	
Nevada							(1)							
PACIFIC														
Washington				40	1		16		7				10	
Oregon				17		15	3						34	
California	6		2	125	1	21	87	1	[d] 23			184	112	4
Total	96	12	398	1,977	47	745	1,962	40	214		24	291	1,592	
Median, 1944-48	164	11	571	2,058	75		740	32	589	4	23	146	2,428	
Year to date 30 weeks	4,048	311	75,867	583,848	2,193	53,240	[1] 8,298	347	57,759	39	727	1,911	33,410	
Median, 1944-48	6,688	275	190,197	543,412	4,274		3,060	292	85,067	259	571	2,076	57,712	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32d) Aug. 14	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	280		112,137	636,241	3,037		7,374		80,457	49		1,451	43,443	
Median, 1943-48 [b]	479		334,488	578,358	5,778		2,797		123,638	342		1,601	85,841	

[a] Period ended earlier than Saturday.

[b] The median of the 5 preceding corresponding periods; for diphtheria, poliomyelitis and typhoid fever the corresponding periods are 1944-45 to 1948-49.

[c] New York City and Philadelphia only, respectively.

[d] Including cases reported as streptococcal infection and septic sore throat.

[e] Including paratyphoid fever; currently reported separately, as follows: Maine, 1; New York, 1; Ohio, 4; Illinois, 1; Maryland 1, Georgia, 3; Kentucky, 1; Tennessee, 1; Texas, 2; Colorado, 1; California, 182. Cases reported as Salmonella infection, not included in the table, were as follows: Massachusetts, 1; New York, 2.

Leprosy: California, 1.

[1] Corrections—Cases.—Poliomyelitis: Week ended July 16, Arkansas, 99 (instead of 101), week ended March 26, North Carolina, 1 (instead of 2); Rabies in animals: week ended June 18, New Jersey, 2 (instead of 1).

Alaska: Pneumonia, 1.

Hawaii Territory: Measles, 5.

CASES OF PLAGUE IN TAOS AND SANDOVAL COUNTIES, N. MEX.

Under date of August 3, 1949, a case of plague in a 10-year-old boy was reported in Cerro, Taos County, N. Mex., with onset on July 29. Later, a case was reported in a 37-year-old man, in Sandoval County. These are the first reports of plague in human beings in that State, but the infection was found in fleas from prairie dogs in Taos County in April of this year and in Sandoval County in June of this year and in fleas from grasshopper mice in May of 1943.

PLAGUE INFECTION IN KANSAS AND NEW MEXICO

Under date of July 29, plague infection was reported proved in specimens of fleas collected in Kansas and New Mexico, as follows:

KANSAS

Thomas County: In a pool of 6 fleas from 2 grasshopper mice, *Onychomys* sp. (reported as leucopus), trapped on July 12 from 5 to 7 miles north of Oakley on U. S. Highway 83, and in a pool of 341 fleas recovered July 13 by flagging abandoned burrows of prairie dogs, *Cynomys ludovicianus*, on a ranch 4 miles south thence 3 miles west, of Halford.

This is stated to be the first demonstration of plague infection in Thomas County, Kans.

NEW MEXICO

Rio Arriba County: In a pool of 78 fleas from 68 white-footed mice, *Peromyscus maniculatus*, trapped July 12 at a location 7 miles east of Dulce on State Highway 17.

DEATHS DURING WEEK ENDED JULY 23, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended July 23, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,233	8,031
Median for 3 prior years	8,135	
Total deaths, first 29 weeks of year	272,687	275,332
Deaths under 1 year of age	577	629
Median for 3 prior years	671	
Deaths under 1 year of age, first 29 weeks of year	18,742	19,518
Data from industrial insurance companies:		
Policies in force	70,326,114	71,001,899
Number of death claims	12,217	10,658
Death claims per 1,000 policies in force, annual rate	9.1	7.8
Death claims per 1,000 policies, first 29 weeks of year, annual rate	9.4	9.8

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended July 9, 1949.—During the week ended July 9, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	------	22	------	59	122	13	65	59	107	447
Diphtheria	------	------	------	87	------	------	------	3	------	90
Dysentery, bacillary	------	------	------	4	------	3	------	1	------	8
German measles	------	4	------	13	10	------	12	72	2	113
Influenza	------	5	1	------	------	3	1	------	------	10
Measles	------	26	1	169	263	68	263	169	293	1,252
Meningitis, meningococcal	------	4	------	------	------	3	------	1	------	8
Mumps	------	20	------	27	100	9	4	5	47	212
Poliomyelitis	------	------	------	13	12	------	1	------	7	33
Scarlet fever	------	4	------	31	34	------	1	8	7	85
Tuberculosis (all forms)	------	4	22	81	12	9	18	------	------	146
Typhoid and paratyphoid fever	1	------	------	7	------	------	------	------	1	9
Undulant fever	------	------	------	3	1	------	------	------	------	4
Venereal diseases:										
Gonorrhea	6	8	8	127	59	36	26	33	45	348
Syphilis	5	6	14	60	41	13	1	5	7	152
Whooping cough	------	4	------	75	25	1	2	2	5	114

Newfoundland cases: Week ended July 2, 1949, chickenpox 1; measles 2; scarlet fever 1; whooping cough 2; gonorrhea 6; syphilis 4. Week ended July 9, 1949, scarlet fever 1; whooping cough 1; gonorrhea 5; syphilis 2.

NORWAY

Notifiable diseases—April 1949.—During the month of April 1949, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	9	Measles	3,477
Diphtheria	22	Mumps	720
Dysentery, unspecified	1	Pneumonia (all forms)	2,413
Encephalitis, epidemic	2	Poliomyelitis	4
Erysipelas	321	Rheumatic fever	94
Gastroenteritis	2,262	Scabies	1,733
Gonorrhea	309	Scarlet fever	344
Hepatitis, epidemic	103	Syphilis	90
Impetigo contagiosa	1,968	Tuberculosis (all forms)	363
Influenza	2,970	Weil's disease	3
Laryngitis	10,174	Whooping cough	3,840
Malaria	2		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Ceylon.—Trincomalee.—The 2 fatal suspected cases of cholera near Trincomalee, Ceylon, reported in PUBLIC HEALTH REPORTS, July 8, 1949, p. 883, were later confirmed. The Government of Ceylon declared Trincomalee free from cholera on June 14, 1949.

China—Amoy.—During the week ended July 9, 1949, 1 fatal suspected case of cholera was reported in Amoy, China.

Plague

Basutoland.—Plague has been reported in Basutoland as follows: Week ended April 16, 1949, 6 cases, 2 deaths, in Masern District; week ended April 23, 1949, 10 cases, 7 deaths, in Mohale's Hoek District; week ended May 14, 1949, 8 cases, 2 deaths, in Mafeting District.

Smallpox

Arabia—Aden.—During the week ended July 2, 1949, 3 cases of smallpox (imported) were reported in Aden, Arabia.

French Equatorial Africa.—During the period June 21–30, 1949, 42 cases of smallpox, with 16 deaths, were reported in French Equatorial Africa.

Netherlands Indies—Java—Cheribon.—For the week ended July 2, 1949, 51 cases were reported in Cheribon.

Typhus Fever

Afghanistan.—During the period April 25–May 24, 1949, 126 cases of typhus fever were reported in Afghanistan.

Yellow Fever

Gold Coast.—According to information dated July 21, 1949, two further suspected cases of yellow fever have been reported in the Gold Coast—one case at Akwatia and one case at Bawdua in Birim District. Of the four suspected cases reported in the Gold Coast in PUBLIC HEALTH REPORTS, August 12, 1949, p. 1020, three cases were stated to have been confirmed, one case shown to be negative, by laboratory examination.

Peru—Cuzco Department.—During the period January 1–31, 1949, one death from yellow fever was reported in Quincemil, Cuzco Department, Peru.

Refresher Courses in Laboratory Diagnosis

The Communicable Disease Center will offer refresher courses in laboratory diagnosis during the period September 12 to December 16, 1949. The following courses are planned:

Laboratory diagnosis of parasitic diseases—September 12 to October 21 (6 weeks).

Laboratory diagnosis of bacterial diseases, part 2, general bacteriology—October 31 to December 2 (5 weeks).

Laboratory diagnosis of rabies—November 14 to November 18 (1 week).

Advanced enteric bacteriology—December 5 to December 16 (2 weeks).

Applications and requests for information should be made to the Chief, Laboratory Division, Communicable Disease Center, 291 Peachtree Street NE., Atlanta, Ga.

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 **AUGUST 26, 1949** NUMBER 34

IN THIS ISSUE

Flourine in Foods

Iodine—A Food Essential

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

CONTENTS

	Page
Fluorine in foods. Survey of recent data. F. J. McClure	1061
Iodine—a food essential. W. H. Sebrell	1075
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended August 6, 1949	1088
Plague infection in Logan County, Kansas, and Sweetwater County, Wyoming	1091
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended July 16, 1949	1091
Finland—Notifiable diseases—May 1949	1091
World distribution of cholera, plague, smallpox, typhus fever, and yellow fever—	
Cholera	1092
Plague	1092
Smallpox	1093
Typhus fever	1095
Yellow fever	1096
Deaths during week ended July 30, 1949	1096

Public Health Reports

Vol. 64 • AUGUST 26, 1949 • *No. 34*

Fluorine in Foods

Survey of Recent Data

By F. J. McClure, Ph. D.*

The analytical data relating to fluorine in foods have accumulated during the past decade to an extent that makes it desirable to assemble the data for purposes of comparison, as well as for an evaluation of the amount of fluorine ingested in the average human diet. With few exceptions, the more recent fluorine data are comparable as regards the analytical procedure since the Willard and Winter technique (*1*), or a slight modification (*2*, *3*, *4*, *5*), has become the most generally utilized fluorine method. While most analysts recognize the desirability of improvements in the fluorine determination (in view of an expected error of at least 10 percent, particularly in the analysis of organic materials), it has been some time since any radical changes have been made in the Willard and Winter procedure. Generally this fluorine method now calls for ashing the sample in the presence of an alkaline fixative at a low temperature, isolation of the fluorine by steam distillation using perchloric acid, and estimation of the fluorine in the distillate by microtitration with thorium nitrate or by comparative colorimetry.

Published results for fluorine in foods from various sources are compiled in table 1. In table 2, the data concerns the relation of the fluorine content of soil and water to the fluorine present in plant produce. Similarly, data concerning the effect of fluorine ingestion on fluorine in animal produce (meat, eggs, and milk) appear in table 1, sections a, d, e. In several of the publications cited, information is lacking as regards the "dry" or "fresh" condition of the material analyzed, and wherever it seemed desirable to supply such information the judgment of the author was based on the analytical figure. In general, results for meats, fish, eggs, milk, and wine are based on the materials as consumed. Other materials are reported on a fresh or a dry-weight basis, or both.

*From the National Institute of Dental Research, National Institutes of Health

The results for animal tissues appear in table 1-a. The effect of sodium fluoride ingestion on fluorine in kidney tissue is notable. To produce this result, however, there was a pronounced induced fluorine toxicosis in the animal. The major portion of fluorine retained in the animal body is deposited in skeletal tissue. As shown in table 1-b, the fluorine in normal edible cuts of meat is of the order of 0.2–0.3 ppm. or less fluorine.

Table 1. *Fluorine in animal tissues, meats, fish, hen's egg, cow's milk, citrus fruits, noncitrus fruits, tea, cereals and cereal products, vegetables and tubers, miscellaneous substances and wine*

a. ANIMAL TISSUES

	Fluorine ppm
Cow's liver, dry wt. (*6*):	
No F added to ration	5.50, 5.80, 5.20
F added to grain ration:	
.022 percent	7.80, 8.50, 5.30
.044 percent	7.30, 8.30, 6.20
.088 percent	8.50, 7.70
Chicken liver, fresh wt. (*7*):	
NaF injected:	
63 mg	0.7015
45 mg	1.209
90 mg	1.291
45 mg	trace
30 mg	1.010
30 mg	1.131
Liver, fresh wt. (*8*)	1.43
Do	1.59
Do	1.52
Guinea pig liver, fresh wt. (*12*)	0.40
Calf liver, fresh wt. (*12*)	0.19
Beef liver (*10*)	0.99
Cow's kidney, dry wt. (*6*):	
No F added to ration	6.9, 8.9, 10.1
F added to grain ration:	
.022 percent	31.8, 25.7, 25.5
.044 percent	34.7, 33.5, 38.2
.088 percent	43.0, 43.7
Guinea pig kidney, fresh wt. (*12*)	0.06
Cow's pancreas, dry wt. (*6*):	
No F added to ration	6.9, 10.3, 8.5
F added to grain ration:	
.022 percent	7.0, 8.2, 9.5
.044 percent	8.3, 9.0, 9.2
.088 percent	9.1, 10.6
Cow's heart muscle, dry wt. (*6*):	
No F added to ration	2.3, 2.7, 2.7
NaF added to grain ration:	
.022 percent	4.8, 3.7, 8.8
.044 percent	7.5, 6.4, 9.7
.088 percent	9.4, 8.7
Guinea pig heart, fresh wt. (*12*)	0.24

b. MEATS

	Fluorine ppm
Chicken (*10*)	1.40
Poultry, canned boned chicken (*11*)	0.63
Beef (*26*)	2.00
Round steak (*10*)	1.28
Beef (*13*)	<0.20
Beef, fresh wt. (*11*)	0.29
Pork (*13*)	<0.20
Pork, fresh wt. (*11*)	0.34
Pork chops (*10*)	0.98
Pork shoulder (*10*)	1.20
Salt pork (*12*)	1.1
Salt pork (*10*)	3.33
Frankfurters (*10*)	1.67
Lamb (*10*)	1.20
Veal (*10*)	0.90
Mutton (*13*)	<0.20

c. FISH

	Fluorine ppm
Fish, fillets (*11*)	1.49
Fish (*10*)	1.63
Mackerel:	
boned (*13*)	<0.2
with bones (*13*)	3.9
fresh (*14*)	26.89
dried (*14*)	84.47
canned (*11*)	12.10
Salmon:	
canned (*13*)	4.5
red, canned (*15*)	8.5
pink, canned (*15*)	9.0
fresh (*14*)	5.77
dried (*14*)	19.34
canned (*11*)	4.16
Sardines:	
canned (*13*)	7.3
Sardines—Continued	
canned (*15*)	12.5
in olive oil (*11*)	16.10
Shrimp:	
canned (*15*)	4.4
edible portion (*11*)	0.93
Codfish:	
fresh (*15*)	7.0
salted (*15*)	5.0
Oysters:	
fresh (*15*)	0.65
unspecified (*10*)	1.58
unspecified (*15*)	1.5
Crab meat, canned (*15*)	2.00
Herring, smoked (*15*)	3.50
Tuna fish flakes, canned (*11*)	0.10

NOTE.—Italic numbers in parentheses are references. See pages 1073–1074.

Table 1. *Fluorine in animal tissues, meats, fish, hen's egg, cow's milk, citrus fruits, noncitrus fruits, tea, cereals and cereal products, vegetables and tubers, miscellaneous substances and wine*—Continued

d. HEN'S EGG

(All analyses based on fresh weight)

	Fluorine ppm
Eggs (*10*):	
Whole	1.18
White	1.48
Yolk	0.59
Eggs (*7*):	
Hen No. 1 [1]	0.360, 0.368, 0.288, 0.165
Hen No. 2 [1]	0.294, 0.463, 0.441, 0.206
Egg (*8*):	
White	0.47, 0.32, 0.14, 0.00
Yolk	1.20, 0.42
Eggs, fresh (*12*)	0.15, 0.21, 0.22, 0.22, 0.42, 0.13, 0.20
Eggs, 1 dozen mixed (*11*)	0.12

	Fluorine ppm
No. F added to ration (*16*)):	
White	0.20, 0.30
Yolk	0.90, 1.20
F in ration (*16*):	
.035 percent:	
White	0.20
Yolk	1.80
.070 percent:	
White	0.20
Yolk	3.30
.105 percent:	
White	0.30
Yolk	3.00

[1] During 4- to 8-week period hens received intermittent intravenous injections of 30–90 mg. NaF.

e. COW'S MILK

No unusual fluoride in cow's ration or drinking water

	Fluorine ppm
Whole milk (*17*)	0.07, 0.09
Do	0.10, 0.15
Do	0.15, 0.17
Do	0.07, 0.22
Fresh milk (*10*)	0.38
Fresh milk, 1 qt. mixed (*11*)	0.09
Fresh milk (*12*)	0.55

	Fluorine pp
Commercial milk (*18*):	
Washington, D. C	0.22, 0.22, 0.26
Washington, D. C	0.14, 0.16, 0.13
Urbana, Ill	0.30, 0.13, 0.11, 0.10, 0.10, 0.10

Fluoride above normal in cow's ration or drinking water

	Fluorine ppm
F in drinking water:	
8 ppm (*18*)	0.26, 0.39, 0.19, 0.17, 0.23, 0.26, 0.18, 0.40, 0.49, 0.28, 0.29, 0.40
0.2 to 500 ppm (*19*)	0.20, 0.30, 0.50, 0.30
0.2 to 495 ppm (*19*)	0.00, 0.30, 0.40, 0.40, 0.40, 0.30, 0.40, 0.30
1.4 ppm (*12*)	0.97, 0.72, 0.91

	Fluorine ppm
F added to grain ration (*17*):	
.022 percent	0.15–0.20
.044 percent	0.11–0.15
.088 percent	0.14–0.26

f. TEA

	Fluorine ppm
Tea (*21*):	
Imported Indian	38.1
Imported Ceylon	8.7, 9.5
Indian Ceylon blends	28.5
Clipper	13.1
Anhwei	91.8, 54.3, 122.6
Amoy	52.7
Ting-ku	178.8
"Doubly scented"	91.7
1st grade Human	60.3
Yunnan	49.7
Jessamine	83.5
Hangchow, best grade	37.5
Hangchow, second grade	93.5
Cheap mixed	398.8
Tea (*13*):	
English breakfast	66.0
Gun powder	67.0
Oolong	41.0
Tea (*22*):	
White tea	6.80
Song, chian	9.89
Asiang-pain	43.20
Red tea	67.07
Lung-ching	70.70
Szechuan	85.63

	Fluorine ppm
Tea (*20*):	
Pu-er	91.25
Kocha	7.8
Makha	3.2
Hankow	4.1
Toko	9.2
Ajax	11.9
Maza wattee	29.4
Rajah	33.1
Lyons	18.4
Five roses	25.6
Gifto	18.4
Liptons	18.3
Indona	19.3
Fargo	18.4
Tea, average of ten samples (*11*)	97.0
Tea, infusion—15 gm. of tea were treated with 1,000 cc. boiling water, steeped 10 minutes and strained (*11*)	1.19
Liptons yellow label (*18*)	53.5
Orange Peko (*18*)	62.8
Tea, infusion—0.122 mg. of fluorine was extracted from one tea ball of 2.55 gm. tea (*18*)	62.8

Table 1. *Fluorine in animal tissues, meats, fish, hen's egg, cow's milk, citrus fruits, noncitrus fruits, tea, cereals and cereal products, vegetables and tubers, miscellaneous substances and wine*—Continued

g. CITRUS FRUITS

	Fluorine ppm
Grapefruit:	0.36
edible portion (10)	0.36
fresh (20)	0.12
Lemon, fresh (12)	.028, .051, .174
Orange, edible portion (10)	0.34
Oranges (20):	
fruit, fresh	0.17–0.07
Brazil fruit, fresh	0.15
Brazil, peel, fresh	0.16
California, peel, fresh	0.18
Jamaica, peel, fresh	0.11–0.14
Oranges—Continued	
Palestine, fruit, fresh	0.04–0.15
Palestine, peel, fresh	0.11–0.15
Spanish, peel, fresh	0.07–0.13
Navel:	
Spain, fresh	0.15
S. Australia, fruit, fresh	0.06
S. Australia, peel, fresh	0.11
Pomelo (20):	
fruit, fresh	0.10–0.16
Florida, fresh	0.04–0.25
Florida, peel, fresh	0.13–0.25

h. NONCITRUS FRUITS

	Fluorine ppm *Fresh wt*	*Dry wt*
Apples (10)	-------	0.42
Apples (12)	0.052	0.21
Apples (20)	0.22	-------
Apples (12)	0.035	0.13
Apples (8)	0.92, 1.10, 1.15	-------
Apples (8)	1.32, 1.30	-------
Apples, fresh only (19)	0.34, 0.77, 0.83, 0.87	-------
Apricots (20)	0.22	-------
Apricots (12)	0.02	0.08
Apricots (12)	0.06	0.24
Banana (20)	0.23	-------
Banana (10)	-------	0.65
Cherry (20)	0.25	-------
Cherries, black (12)	0.18	0.61
Currants (20)	0.12	0.69
Fig (20)	0.21	-------
Grapes (20)	0.16	-------
Grape juice (12)	0.093	-------
Grape seed (12)	0.105	-------
Gooseberries (20)	0.52	-------
Gooseberries (12)	0.11	0.72
Guava (20)	0.34	-------
Mango (20)	0.18	-------
Pawpaw (20)	0.15	-------
Pear (20)	0.19	-------
Prickly pear (20)	0.26	-------
Pears (10)	-------	0.70
Peach (20)	0.21	-------
Plum (20)	0.21	-------
Plum (12)	0.22	0.10
Pineapple (20)	0.14	-------
Pineapple tinned (26)	0.00	-------
Pomegranate (20)	0.20	-------
Quince (12)	0.06	0.37
Quince (20)	0.20	-------
Sweet melon (20)	0.20	-------
Strawberry (20)	0.18	-------
Watermelon (20)	0.11	-------

i. CEREALS AND CEREAL PRODUCTS

	Fluorine ppm *Fresh wt*	*Dry wt*
Corn:		
unspecified (22)	0.62	0.70
unspecified (23)	-------	1.0–2.0
canned (13)	<.20	-------
canned (10)	-------	.42
unspecified (22)	-------	5.09
yellow (13)	<.10	-------
germ (23)	-------	8.0–11.0
germ (13)	-------	15.0
meal, as purchased (11)	.22	-------
meal (25)	-------	2.00
flakes (10)	-------	1.33
Ralston (10)	-------	.58
Wheat:		
whole (22)	-------	.53
unspecified (21)	-------	1.70
unspecified (13)	<.10	-------
unspecified (27)	.7	.8
bran (27)	.29	.33
bran (13)	<.2	-------
germ A, commercial (13)	1.7	-------
germ B, commercial (13)	4.0	-------
germ, pure (13)	<.1	-------
germ, pure (27)	.88	1.00
Cream of Wheat (10)	-------	.55
Flour:		
wheat, white (22)	.35	-------
self-rising (11)	.45	-------
whole wheat (25)	-------	1.32
white (27)	.27	.31
biscuit (26)	-------	.0
baking (27)	.31	.35
Bread:		
white (11)	-------	.54
white (26)	-------	1.00
white (10)	-------	.82
Biscuits (26)	-------	0.0–1.0
Do	-------	2.0–2.0
Ginger biscuits (26)	-------	2.0–2.0–2.0
Rice:		
unspecified (27)	.67	.76
whole (13)	<.10	-------
unspecified (21)	-------	.70
middle (22)	.19	-------
unspecified (32)	-------	.50
Soy beans (21)	-------	4.00
Soy beans (11)	1.33	-------
Soy flour (11):		
low fat	-------	.52
with fat	-------	1.45
Buckwheat:		
unspecified (34)	-------	2.00
whole (21)	-------	1.70
bran (21)	-------	1.60
Millet (21)	-------	.20
Millet (12)	.60	.91
Oats:		
unspecified (34)	-------	3.0
crushed (13)	<.20	-------
Mother's (10)	-------	.92
fresh (27)	.25	.29
Rye:		
from Norway (18)	-------	.34, .64, 1.30
unspecified (12)	.61	.69
Blackeyed peas (11)	.23	-------
Chick peas (11)	.14	-------
Cottonseed:		
meal (13)	12.0	-------
meal (23)	20.0–31.0	-------
hulls (23)	12.0–14.0	-------
Spaghetti (10):		
canned	-------	1.15
dry	-------	.80
Macaroni, dry (10)	-------	.82

Table 1. *Fluorine in animal tissues, meats, fish, hen's egg, cow's milk, citrus fruits, noncitrus fruits, tea, cereals and cereal products, vegetables and tubers, miscellaneous substances and wine*—Continued

j. VEGETABLES AND TUBERS

	Fluorine ppm	
	Fresh wt	*Dry wt*
Aniseed (*20*)	0.4	--------
Amaranth (*21*):		
red	--------	8.5
green	--------	6.9
Asparagus, canned (*10*)	--------	0.48
Beans:		
string (*10*)	--------	0.64
string, canned (*10*)	--------	0.67
string (*11*)	0.13	--------
string, edible pods (*28*)	--------	3.2, 4.8
green (*12*)	0.15	1.01
light green (*12*)	0.11	0.73
lima, dry (*10*)	--------	4.51
lima, seeds (*28*)	--------	2.2
dry (*22*)	--------	1.04
dried (*13*)	--------	<0.20
navy, dry (*10*)	--------	1.70
Beets:		
unspecified (*20*)	0.2	--------
fresh (*10*)	--------	0.60
root (*21*)	--------	2.8
leaves, dry (*21*)	--------	3.80
tops (*28*)	--------	3.4
leaves (*12*)	0.38	3.45
roots (*28*)	--------	4.3
roots, sugar beet (*28*)	--------	3.3
string (*12*)	0.32	6.09
Cauliflower:		
fresh (*10*)	--------	0.45
flower (*12*)	0.12	0.88
leaves (*12*)	0.08	0.83
unspecified (*20*)	1.0	--------
Cabbage:		
large (*22*)	--------	9.34
foreign (*22*)	--------	15.38
fresh (*10*)	--------	0.70
unspecified (*22*)	0.13	--------
edible head (*28*)	--------	3.4
without leaves (*12*)	0.8	9.5
edible part (*12*)	0.15	1.5
unspecified (*20*)	0.3	--------
loose leaf (*12*)	0.38	1.31
loose leaf, stalk (*12*)	0.12	0.86
Carrots:		
unspecified (*20*)	0.4	--------
fresh (*10*)	--------	1.30
root (*28*)	--------	8.4
unspecified (*13*)	<0.20	--------
unspecified (*21*)	--------	6.92
Celery:		
unspecified (*22*)	--------	1.47
unspecified (*11*)	0.14	--------
powder (*11*)	0.10	--------
edible stalks (*28*)	--------	8.5
unspecified (*12*)	0.70	5.70
Cress (*12*)	0.24	4.38
Cucumber (*20*)	0.20	--------
Colza shoot, red (*22*)	--------	3.88
Colza (*22*)	--------	2.15
Eggplant (*20*)	0.4	--------
Endive (*20*)	0.2	--------
Garlic:		
green (*22*)	--------	17.72
unspecified (*22*)	--------	7.17
unspecified (*20*)	0.3	--------
Ginger plant (*22*)	--------	2.36
Kale (*11*)	0.16	--------
Kale (*20*)	3.0	--------
Leeks (*22*)	--------	3.90
Leeks (*20*)	0.1	--------
Lettuce:		
loose, head (*28*)	--------	11.3
cabbage (*12*)	0.30	4.45
prickly (*12*)	--------	5.18
fresh (*10*)	--------	0.42
Marjoram (*12*)	1.92	8.68
Mustard:		
greens (*11*)	0.15	--------
leaves, salted, dried (*21*)	--------	3.0–4.8
Onions:		
green (*22*)	--------	10.11
unspecified (*20*)	0.60	--------
unspecified (*12*)	0.24	2.40
Parsley:		
tops (*28*)	--------	11.3
unspecified (*20*)	0.8	--------
unspecified (*12*)	1.04	8.73
Parsnip, roots (*28*)	--------	5.5
Peas:		
unspecified (*20*)	0.6	--------
green (*21*)	--------	6.69
fresh (*10*)	--------	0.60
Potatoes:		
white (*10*)	--------	0.96
unspecified (*13*)	0.20	--------
whole (*17*)	6.4	22.0
peelings (*12*)	0.07	0.35
Irish, tuber (*28*)	--------	1.4
white, unpeeled (*22*)	0.16	--------
unspecified (*21*)	--------	0.73
unspecified (*26*)	--------	1.0
I, from Norway (*18*)	--------	0.9
II, from Norway (*18*)	--------	0.3
sweet, unpeeled (*11*)	0.13	--------
sweet (*13*)	<0.20	--------
sweet (*10*)	--------	1.08
Pumpkin (*20*)	0.10	--------
Radish (*20*)	0.8	--------
Rhubarb (*20*)	0.4	--------
Rutabaga:		
tops (*28*)	--------	7.0
roots (*28*)	--------	2.9
Spinach:		
fresh (*10*)	--------	1.11
unspecified (*20*)	1.8	--------
unspecified (*22*)	--------	7.97
unspecified (*11*)	0.21	--------
unspecified (*11*)	0.36	--------
unspecified (*28*)	--------	28.3
winter (*12*)	0.44	3.80
Squash, fresh (*10*)	--------	0.63
Shepherd's purse (*4*)	--------	2.28
Summer savory (*12*)	2.67	12.10
Tomatoes:		
unspecified (*12*)	0.24	2.40
fresh (*10*)	--------	0.53
fruit (*28*)	--------	0.0
Turnips:		
greens (*22*)	0.10	--------
tops (*28*)	--------	1.7
roots (*28*)	--------	2.6
unspecified (*13*)	<0.20	--------
unspecified (*20*)	0.30	--------
fresh (*10*)	--------	0.56
Watercress (*20*)	1.0	--------

Table 1. *Fluorine in animal tissues, meats, fish, hen's egg, cow's milk, citrus fruits, noncitrus fruits, tea, cereals and cereals products, vegetables and tubers, miscellaneous substances and wine*—Continued

k. MISCELLANEOUS SUBSTANCES

	Fluorine ppm Fresh wt	Fluorine ppm Dry wt
Peanuts:		
unspecified (*10*)	--------	1.36
unspecified (*13*)	<0.20	--------
tops (*28*)	--------	1.7
kernel (*28*)	--------	1.5
Almonds (*12*)	0.90	0.90
Hazelnut (*12*)	0.30	0.30
Chestnut (*12*)	--------	1.45
shell (*12*)	--------	0.24
Coconut, fresh (*11*)	0.00	--------
Cocoa (*26*)	0.5, 0.50, 2.0	--------
as purchased (*11*)	0.92	--------
Plain chocolate (*26*)	0.50	--------
Milk chocolate (*26*)	0.5, 1.0, 2.0	--------
Molasses (*11*)	0.00	--------
Sugar (*10*)	0.32	--------

	Fluorine ppm Fresh wt	Fluorine ppm Dry wt
Honey (*26*)	1.00	--------
Gelatin (*26*)	0.00	--------
Glucose (*26*)	0.50	--------
Malt (*26*)	1.0, 1.5	--------
Powdered ginger (*26*)	1.00	--------
Baking powder (*13*):		
A	220.0	--------
B	19.0	--------
C	<0.1	--------
Coffee (*21*):		
Mocha, Arabian	1.6	--------
Del Monte, Brazilian	0.7	--------
E. B. C., Brazilian	0.2	--------
best raw Java	1.1	--------
Butter (*10*)	1.50	--------
Cheese (*10*)	1.62	--------
Pork and beans, canned (*10*)	1.40	--------

l. WINE

	Fluorine ppm
Chinese, Shao-shing (*21*):	
best grade	0.07
second grade	0.05
Chinese Lao, pai, chiu (*21*)	0.09
Port (*21*)	0.24
Beer (*11*)	0.20
Neuenberger (*12*)	0, 0, 0, 0, 0, 0.06, 0.08, 0.10, 0.10, 0.17, 0.18, 0.20, 0.24, 0.26, 0.34, 4.68, 6.34.
Walliser (*12*)	0, .03, .04, .07, 0.11, 0.12, 0.20, 0.21, 0.23, 0.23, 0.25, 0.25, 0.41, 0.47, 0.54, 0.54.

	Fluorine ppm
Franzosiseher (*12*):	
Weisswein, Cote d'or	0.22
Rotwein, Burgunder	0.31
Rotwein, Cote du Rhone	0.21
Do	0.07
Do	0.10
Italienischer, Rotwein (*12*)	0.21
Spanisher, Weisswein, Xers (*12*)	0.21
Algerischer, Weisswein (*12*)	0.26
Wine (*35*):	
variously dated	3.8, 3.3, 2.4
1938–1941	4.1, 2.1, 3.3, 2.7, (slight trace) 4.1, 3.3.
white Sta. Barbara, 1942	3.3
red, Sta. Barbara, 1942	5.0

Seafoods (table 1-c) are particularly interesting because they generally contain more fluorine than any other food, except tea, which obviously is not in a class with seafoods as an edible substance. Sea water may contain upwards of 1.2–1.4 ppm fluorine (*9*) and is the source of fluorine in seafood. The amount of bone remaining, particularly in canned fish, no doubt determines to a major extent the quantity of fluorine contained in the product.

The amount of fluorine in the hen's egg (table 1-d) is approximately 0.2–0.4 ppm. The fluorine results recorded in the table were obtained during an experiment (*16*) in which rock phosphate was a source of fluorine in the hen's ration for a period of 28 months. There was a definite increase of fluorine in the egg yolk, the fluorine being present almost exclusively in the acetone-insoluble portion of the fat-like substance of the egg yolk.

The fluorine content of cow's milk has never proved to be affected by fluoride in the cow's ration or drinking water (table 1-e). Normally cow's milk contains 0.10–0.20 ppm fluorine.

Fluorine in tea has been studied extensively (table 1-f). The data agree that tea is an unusual plant substance in its fluorine content. It has been reported that 75 percent or more of the fluorine in tea is

extracted by boiling water (*18, 21*). It has been estimated also (*18*) that about 0.1 mg. of fluorine may be present in the hot water extract from one tea ball (2.5 gm. of tea contains 62.8 ppm fluorine in the dry tea).

The data for fluorine in citrus fruit (table 1-g), with three exceptions, were obtained by Hamersma (*20*). These results, based on the fresh or edible material, indicate the presence of about 0.10 ppm or less fluorine.

A number of noncitrus fruits (table 1-h) are also reported by Hamersma (*20*), the origin of most of his material being the Union of South Africa. In the United States, fluorine in apples has attracted much interest because of a presumed health hazard arising from a fluoride spray remaining on the apples (*24*).

The common cereals and cereal products have been analyzed extensively for fluorine (table 1-i) as would be expected for such important articles of the diet. The fluorine figures are quite variable, but for corn and wheat particularly and their edible produce, the values generally are extremely low, i. e., of the order of 0.10 or 0.20 ppm or less fluorine in the fresh material.

The seemingly high fluorine results for several vegetables and tubers (table 1-j) may be questioned in some instances, because of the possibility of soil contamination. The majority of results on the fresh weight basis, however, are in fairly good agreement, i. e., 0.10 to 0.30 ppm is about the average amount to expect.

A variety of results on a number of miscellaneous substances are shown in table 1-k. The majority of these materials, however, do not constitute a very important part of the average diet.

Fluorine in wine (table 1-l) has been studied recently by von Fellenberg (*12*), whose laboratory is in Switzerland, and by de Almedia (*35*). The results reported by de Almedia appear to be unusually high. Sodium fluoride formerly had some use in cleaning wine tanks and casks, but there is no hazard from this type of fluoride usage at this time. Although consumption of wine, particularly among Europeans and South Americans, may be unusually high, there is at present no knowledge that wine causes an unusual dietary fluorine intake.

Effect of Soil and Water Fluorine on Plant Fluoride

The data in table 2 answer the question of the relation of fluorine in plants to the fluorine in the water and soil in which the plants grow.

With few exceptions, and these seem to apply mostly to roots and tubers, fluorine in plant produce is not readily affected by fluorine in the soil and local water. According to Bartholomew (*33*), nutrient solutions containing fluorine up to 10 ppm may cause large increases of fluorine in cowpea roots, but the tops are increased in fluorine only when the quantity of fluorine in the roots is very large. Fluorine in

Table 2. *Fluoride content of plants grown in soil or water containing added fluoride (all figures are ppm of fluorine)*

Reference 19 (dry weight):	*No fluoride added to soil*	*Calcium fluoride added to soil*
Corn	trace	trace
Hogari	0.00	2.1
Soybeans	.83	1.2
Wheat	.69	1.0
Wheat, stalks and leaves	3.70	7.2
Alfalfa:		
1st cutting	7.0	15.0
2d cutting	4.5	10.8
3d cutting	5.0	---------
4th cutting	6.0	11.3

Reference 19 (fresh weight):	*No fluoride added to soil*	*Sodium fluoride added to soil* 800 ppm	1600 ppm	3200 ppm
Beets	1.7	6.5	------	17.7
Carrots	1.0	3.0	0.4	1.3
String beans	.0	------	.0	-------
Yams	.0	7.6	------	8.2
Tomatoes	.7	.5	2.3	1.2

Reference 29 (air dry basis):	*No fluoride added to soil*	*Phosphate fluoride fertilizer added to soil*		
Wheat grain	0.82	0.94	0.99	0.32
Do	.30	.48	.46	.26
Oat grain	1.25	1.75	.70	1.66
Alfalfa hay	No consistent or greatly increased fluorine content.			
Mixed hay				
Clover and timothy hay				
Oat straw				
Wheat straw				
Cowpea hay				

Reference 34:[1]	*Mineral fluorides added to soil*
Lawn grass	No appreciable effect on fluorine content.

Reference 21:[2]	*No fluoride added to soil* Fresh wt	Dry wt
Wheat	0.20	----------
Rice	0.90	----------
Barley	0.02	----------
Soybeans	0.67	----------
Cowpeas	0.43	----------
Green beans	0.17	----------
Green peppers	0.14	----------
Mustard leaves	----------	26.55
Turnip leaves, salted	----------	4.04
Tea, fresh[3]	1.75–7.8	----------
Tea, roasted	15.0–71.0	----------

[1] Fluorine a normal constituent of vegetation in study area (western Pennsylvania).
[2] Study area "near fluorine area" in China.
[3] Picked in later summer instead of usual springtime, suggesting increase of fluorine with age of leaves.

Table 2. *Fluoride content of plants grown in soil or water containing added fluoride (all figures are ppm of fluorine)*

Reference 11 (dry weight):[4]	*No fluoride added to soil*
Wheat	0. 76–1. 15
Wheat flour	0. 50

Reference 20 (fresh weight):	*Fluorine in water for plants* [5]
Cabbage	6. 4
Salad	12. 1, 28. 3
Salad seed	21. 3
Mealies	<1. 0, 0. 7, 0. 1
Beetroot	6. 4, 3. 1
Beetroot leaves	9. 1, 0. 6
Carrots	9. 1, 5. 4
Carrot leaves	6. 9, 56. 6
Tomatoes	2. 8, 6. 4, 1. 8
Leeks	54. 7
Orange leaves	25. 7
Radish	12. 0
Radish leaves	132. 0
Guavas	2. 1
Beans	2. 8
Pumpkin	3. 4
Pumpkin peel	<0. 1

	Fluorine (ppm) in local water supply			
Reference 10:[6]	*0.0–0.8*	*1.0, 2.0, 3.0*	*3.1–6.0*	*6.1–18.0*
Squash, white	0. 42, . 36	0. 07	0. 11, 0. 26	0. 36, 0. 36
Squash, green	0. 32	0. 08	0. 13, 0. 24	--------
Tomatoes, green	--------	--------	--------	0. 41
Tomatoes, red	0. 62	--------	0.31,0.29, 0. 16	0. 47
Onions, green	--------	--------	0. 72	0. 25
Onions, white	--------	0. 52, 0. 51	--------	0. 12
Beets	--------	0. 65	0. 53	0. 32, 0. 73
Carrots	--------	0. 63, 0. 43	0. 72, 1. 34	0. 74
Beans, string	0. 16	0. 30	0. 43	--------
Lettuce	--------	0. 27	--------	--------
Potatoes	--------	--------	--------	0. 81
Cucumbers	--------	--------	0. 15	--------
Okra	0. 20	--------	0. 42	--------
Chard	--------	--------	0. 85	--------
Turnip tops	--------	--------	0. 69	--------

Cowpeas (Reference 33):	*Fluorine in nutrient solutions ppm*	*Fluorine ppm In roots*	*Fluorine ppm In tops*
NaF in nutrient solution	0. 25	13. 7, 58. 0	0. 0
	0. 50	8. 0, 13. 7	0. 0
	1. 00	39. 1, 60. 0	0. 0
	3. 00	237. 5	0. 0
	3. 00	550. 0	8. 0
	10. 00	826. 0	26. 2
	10. 00	1, 086. 0	40. 0
CaF_2 in nutrient solution	0. 25–0. 50	0. 0	0. 0
	7. 72	84. 3	0. 0
	7. 72	78. 3	11. 0
Na_2SiF_6 in nutrient solution	0. 25–0. 50	0. 0, 13. 7	0. 0
	1. 00	37. 4, 42. 7	0. 0
	10. 00	1, 970. 0	415. 0
	10. 00	1, 116. 0	475. 0

[4] Wheat produced in Deaf Smith County, Tex.
[5] Water for plants contained 4.0–12.7 ppm fluorine. Study area in South Africa.
[6] Results are presumably on fresh-weight basis.

wheat changed little when calcium fluoride was added to soil plots (*19*). In studies of control vs. fluoride plots (*19*), fluorine in beets and yams increased notably when an excess of sodium fluoride was applied to the soil. Fertilization of soil with phosphates and slags containing fluorine may increase fluorine in drainage waters (*29*), but plant fluoride was not increased (*29, 30*). As much as 2,300 ppm fluorine was added to the soil in one experiment (*30*), whereas an average figure for fluorine in surface soils is about 292 ppm (*28*). Results of analyses of grains and forage crops from fluoride areas frequently show unusually high fluorine concentrations, but this may be caused by contamination with soil dust. The evidence regarding soil fluoride and its effect on fluorine in plants shows generally a negative effect.

Although all evidence points to the contrary, the fluorine in local water supplies has been suggested frequently as influencing fluorine in plant life. Machle, Scott, and Treon (*10*) found no correlation between fluorine in certain food plants and fluorine in the local water supplies of Arizona. Wheat produced in Deaf Smith County, Tex., a fluoride water area, did not show an unusual fluorine content (*11*). Hamersma (*20*) has presented results regarding the effects of water containing 4.0–12.7 ppm fluorine on vegetables produced in small private gardens. A number of his results are unusually high for fresh materials and a residue of fluoride on the plant materials is suggested by his notation that the garden was watered by hose. As in the case of soil fluoride, there is no indication that fluorine in the local water supplies affects food fluoride Sources of fluoride-bearing potable waters are, with few exceptions, deep wells, and these waters are not used for irrigation purposes. It is not to be expected, therefore, that normal use of water in fluoride water areas would add fluoride to the local plant produce.

Fluorine may be increased in foods cooked in fluoride waters, as the following results presented by Smith, Smith, and Vavich (*19*) indicate:

Food	*Cooked in Distilled water*	*Cooked in water containing*	
		5 ppm fluorine	*24 ppm fluorine*
	ppm	*ppm*	*ppm*
Pinto beans	2.0	--------	37.1
Beets	0	1.0	---------
Potatoes	[illegible].5	--------	9.7
Cabbage	0	3.6	---------
Carrots	2.3	3.2	---------
Cauliflower	0	4.2	---------
Oatmeal	.9	--------	22.8
Spinach	2.0	4.0	---------
Italian squash	.2	3.8	---------
Brussel sprouts	.2	2.9	---------

Assimilation of Natural Fluorine

The body's assimilation of "natural" fluorine in foods has been subjected to limited investigation. In addition to being largely extracted from a 2-percent infusion of tea leaves, the fluorine in tea, according to Reid (*21*), is capable of producing the characteristic striations in the incisor teeth of rats. Fluorine from various sources was administered at levels of 9–12 ppm to rats by Lawrenz and Mitchell (*31*) who found that green-tea fluoride was only about 5 percent less well assimilated than was sodium fluoride or calcium fluoride. An average of 31.7 percent of the fluorine in green tea was retained as compared with 33.7 percent retention from sodium fluoride.

Results on the rats' metabolism of the fluorine contained in canned fish are reported as follows by Lee and Nilson (*14*):

Source of fluorine in rat's diet	*F in diet*	*Total F ingestion*	*Percent stored*
	ppm	*mg.*	
Salmon (fresh)	5. 77	13. 87	19. 75
Salmon (dried)	19. 34	12. 10	20. 25
Mackerel (fresh)	26. 89	50. 75	21. 47
Mackerel (dried)	84. 47	49. 20	24. 24

This percentage of fish fluoride body storage by the rat is somewhat low when compared with the usual retention of inorganic fluorides by the growing rat (*31*, *32*), but the quantities ingested in this study (*14*) are also relatively high.

In general it appears that natural fluorine in fish, tea, and other foods is largely available for assimilation. This conclusion is indicated also indirectly by urinary excretion data mentioned later on in this discussion.

Discussion

In a previous article (*36*) the total food-borne fluorine in the diets, exclusive of drinking water, of children 1–12 years old was estimated to be 0.25 mg.–0.55 mg. daily. Uncertainties surrounding food-fluorine analytical data at that time (1943) suggested that estimates of dietary intake should be based on 0.1, 0.2, 0.5, and 1.0 ppm fluorine in the dry weight of average foods. The analytical fluorine data accumulated since then do not substantially change these quantities—0.25–0.55 mg. fluorine daily in food—although the lower values, 0.25–0.30 mg. fluorine in the daily food, exclusive of drinking water, are probably more representative and in accord with the analytical data for fluorine in foods. Other fluorine analyses of entire diets exclusive of drinking water have indicated 0.25–0.32 mg. fluorine in the average daily food alone (*37*). Another study indicates 0.45 mg. fluorine in the average diet (*38*) where the drinking water is practically fluoride free.

It may be pointed out that 0.25–0.30 mg. of dietary fluorine may be applicable to average daily diets throughout the United States and perhaps other parts of the world. Thus Machle et al. (*10*) and McClure and Kinser (*39*), studying the urinary excretion of fluorine, found the urinary fluorine analysis to be a valuable criteria of the daily water-borne fluorine intake. In widely scattered areas in the United States, where the drinking water contained only traces of fluorine, the urinary fluorine may be attributed largely to food-ingested fluorine and is quite uniform, i. e., 0.2–0.3 ppm (*39*). This observation was regarded as indicative of a uniform content of fluorine in average daily diets, regardless of the locality. Similar urinary fluorine data were obtained recently with respect to Oslo, Norway, where the drinking water contains about 0.1 ppm fluorine (*18*).

Disregarding certain extreme industrial exposures, it is generally true that drinking waters containing upwards of 1.00 or more ppm fluorine are the source of the major quantities of dietary fluorine. As regards water containing 1.00 ppm fluorine, it is estimated that 1.0–1.5 mg. fluorine (based on an estimated 1,000–1,500 cc. water consumed daily) are ingested daily by an average adult via drinking water and water added to cooked foods (*36*). In the case of children 1–12 years old, drinking water containing 1.00 ppm fluorine will contribute an estimated 0.4–1.1 mg. fluorine daily above the fluorine in food (*36*). This added quantity of fluorine ingested during the crown calcification period of tooth life—through ages 8 to 10, or through ages 12 to 16 if the third molar teeth are to be considered—is the estimated amount of water-borne fluorine now associated with the partial alleviation of dental caries (*40*). The advantages to dental health surrounding the use of drinking water containing 1.00 ppm fluorine has justified investigation of the dental health value of a direct addition of sodium fluoride to community water supplies (*41*) and has suggested also the direct addition of a fluoride supplement to children's diets during formative tooth life (*36*).

The importance of fluorine in preventive dentistry has been widely discussed and thus far remains irrefutable (*40*). Many problems, however, have yet to be resolved regarding the most efficacious utilization of fluorides in dental caries prevention. Where fluorides are not present in drinking water and cannot be provided via a community water supply, serious consideration seemingly may be given to the advantages of a direct dietary fluoride supplement. For purposes of dental health it appears that during formative tooth life the average child's diet should contain an additional dental optimum supplement of a fluoride equal to about 1.00 mg. of fluorine daily. The accumulated data on the fluorine content of foods indicate that the average child's diet does not provide a dental optimum quantity of fluorine.

Summary

A survey of recent analytical data for fluorine in foods has been compiled. The majority of foods found in the average diet contain from 0.2–0.3 ppm or less fluorine in the food as consumed. Tea and seafoods are notable exceptions, the former containing upwards of 75 to 100 ppm fluorine in the dry tea, whereas seafoods may contain 5–15 ppm fluorine. Cow's milk contains about 0.1–0.2 ppm fluorine. Fluoride added to the cow's ration or drinking water has no influence on the milk-fluoride. Fluorine in soil and water has little or no influence on the fluorine content of edible plant produce. Although the data are limited, it appears that natural food-borne fluorine is largely available for body assimilation.

Exclusive of drinking water, the average diet appears to provide 0.2–0.3 mg. of fluorine daily. However, it has been observed that an additional intake of fluorine during formative tooth life, via drinking water containing 1.00 ppm or slightly more fluorine, is a distinct dental health advantage.

It is justifiable, therefore, to consider the possibility of a direct dietary fluoride supplement where the drinking water does not provide a dental optimum quantity of fluorine.

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Iodine—A Food Essential

By W. H. SEBRELL, M. D.*

In a cooperative effort, the salt industry, medical profession, public health authorities and the Federal Government are seeking to protect and improve the health of American citizens by an educational campaign aimed at getting them to use a nutritionally improved salt.

The average United States citizen enjoys better health than the average citizen of most other countries. His food supply is also better than average, but many people in this country do not get the full recommended allowance of all the dietary essentials. It is well known that deficiency in any of these essentials results in ill health and disease.

We know that iodine in appropriate amounts, like iron, calcium, copper, and many other chemical elements, is essential throughout life. Also it is known that many people in all sections of this country do not get enough iodine from their food to meet their normal requirements. All doctors know that long-continued iodine deficiency may result in serious disease, or at least in a chronic state of border-line malnutrition. Therefore, in connection with the food-essential iodine it is necessary to discuss the deficiency disease, goiter, which results from lack of sufficient iodine.

It has been demonstrated many times in this country and abroad that iodine deficiency is easily corrected and better health achieved through the daily routine use of table salt to which tiny amounts of iodine have been added by the manufacturer. This salt is as pure as, and tastes no different from, ordinary salt. It can be obtained at no extra cost or inconvenience to the consumer, and, once acquainted with the facts, he can voluntarily insure his supply of this food essential.

Function and Importance of Iodine and Endocrine Glands

The newest studies of the human body emphasize the human being as a "whole man." For example, recent research proves that the pituitary gland at the base of the brain produces a secretion which stimulates the thyroid gland, and that the thyroid secretion can inhibit or stop this pituitary secretion. So important is this situation that Salter in 1940 called it the "pituitary thyroid axis."

The pituitary and thyroid glands often are called ductless glands or glands of internal secretion, because their secretions pour directly

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844962—49——3

into the blood or the lymph, instead of running through a tube or duct.

The pituitary (or hypophysis) is a small gland which is fastened to the base of the brain. Its anterior lobe has been dubbed the "master gland" because of its importance to the body and its influence on other glands. Eleven different physiological effects or influences on body performance have been discovered in this anterior pituitary gland. At least six of these effects seem to be from distinct hormones. The action of these hormones can be classified into two groups. One group deals with effects on other endocrine glands, such as the thyroid-stimulating hormone, nicknamed TSH, mentioned already, and hormones which stimulate the adrenals, the parathyroids, the pancreas, and the sex glands. The other group of pituitary hormones acts on a variety of tissues.

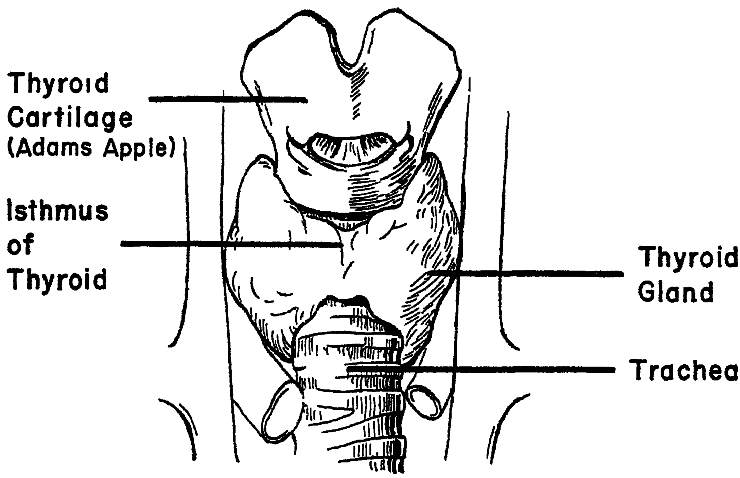
The thyroid gland is a large U-shaped gland in the neck. When it becomes enlarged, it is recognized as goiter. The word "thyroid" means "shield-shaped," and was given to the gland in 1656 by a London physician, Thomas Wharton. Dr. Wharton poetically told how the thyroid contributes to the beauty of the neck by filling up the vacant spaces around the larynx, particularly in women. More matter-of-factly, the thyroid gland has been likened to a pair of Brazil nuts on either side of the windpipe. A band of thyroid tissue, called the isthmus, connects the two lobes. Sometimes the thyroid is described as a thickened U in appearance. Sometimes an additional lobe, called the pyramid of Lalouette runs upward from the upper border of the isthmus. The weight of the thyroid gland in the male varies from 20 to 60 grams, or about 1 to 2 ounces. The normal thyroid in women usually is a little heavier.

Its rich supply of blood and lymph attests to the importance of this gland to the entire body.

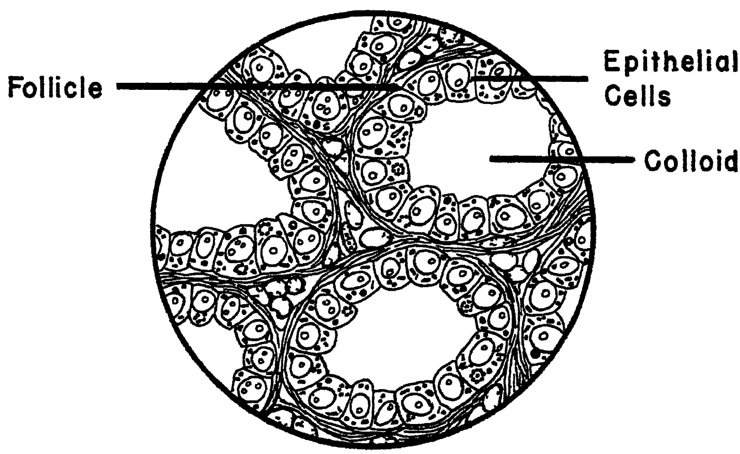
The microscopic appearance of the thyroid tissue shows why Dr. J. H. Means called the thyroid both a factory and a warehouse. Two kinds of tissue comprise the gland. The supporting tissue is a fibrous connective tissue, which makes the framework and the capsule of the gland.

The active, or functional, tissue consists of a number of follicles (also called vesicles, acini, or alveoli). These tiny follicles resemble sacs within an orange section, except, of course, that they tend to be spherical and are microscopic in size. It would take about 250 follicles to cross the diameter of a dime.

Each tiny follicle consists of a single layer of cells forming the outside. These epithelial cells are the actual factory which manufactures the thyroid hormone. In the center of each follicle is the colloid fluid, which is the storage or warehouse form of the thyroid hormone or secretion. In normal health, each sphere is plumply full of colloid.



THYROID BODY



FOLLICLES OF A HUMAN THYROID

When iodine is eaten in the form of iodized salt, or iodine-rich food, such as oysters, salmon, or tuna fish, it travels through the blood in the form of a salt, an iodide. The thyroid gland, of all the body tissues, has an affinity for iodine. When the thyroid gland absorbs the iodide, it is oxidized, that is oxygen is added, by an enzymatic process. This releases iodine in a form which readily combines with an amino acid, tyrosine, to form the long-named chemical diiodotyrosine. Two molecules of this latter compound combine to form thyroxine Thyroxine is the thyroid hormone. After manufacture, this hormone, thyroxine, may be carried by the blood stream to produce striking effects in many parts of the body. Or it may be stored as a colloid, thyroglobulin, in the centers of the follicles to be called upon when needed.

Course of Food Iodine in the Body

Food iodine ↓	**Iodized salt, seafood**
Alimentary canal ↓	**iodine absorbed by body**
Blood stream ↓	**iodine carried to the thyroid**
Thyroid gland ↓	**iodide (iodine)+tyrosine=Thyroxine+ protein=Thyroglobulin**
Thyroglobulin	**used as hormone or stored as colloid**

Just as the mineral calcium is essential for the formation of bones and the mineral iron is necessary to form hemoglobin for blood, so iodine is absolutely essential for the formation of thyroid hormone, or thyroxine—no iodine, no thyroxine. The thyroid normally contains from 15 to 20 milligrams of iodine. In normal adults, a supply of about 75 milligrams of iodine per year will maintain the thyroid in normal condition.

Some of the normal functions of the thyroid gland are quite popularly known. The thyroid hormone controls the rate of heat production in the body by controlling the rate of cell oxidation. Heat production is coupled with energy liberation from the cells. Basal metabolism tests measure thyroid activity by measuring the rate of heat production in a resting individual.

Other functions of the thyroid are to aid in the stimulation of normal growth of bones, hair, and skin; the normal development of the brain; the stimulation of sexual development at puberty; the maintenance of a normal pregnancy; and the production of an adequate milk supply during nursing.

Types of Goiter

The word "goiter" means an enlargement of the thyroid gland. As most diseases of the thyroid gland are accompanied by an increase in size of the gland, in popular language a goiter usually means a large

and conspicuous thyroid gland. Shakespeare, in The Tempest, writes of men "whose throats had hanging at them wallets of flesh." But goiter was known in ancient times when the water from certain wells was said to produce goiter.

Simple Goiter

Simple goiter is by far the commonest form of goiter, and occurs in all parts of the world. But its distribution is not even. Goiter areas exist, often separated only from the next area by a change in the watershed, or the supply of salt.

Simple goiter is sometimes called benign goiter, because it often disappears when a particular strain on the body, such as puberty or pregnancy, is past. Simple goiter also has been called "physiologic goiter," because it so often is associated with a physiological period or situation, notably puberty, but also pregnancy, lactation, and infectious diseases with fever. But leading authorities have objected to the use of the term physiological, implying normal, because, if the individual going through the period of stress is given a really adequate amount of iodine, enlargement and goiter are prevented. Also, cases do occur when a simple goiter does not subside, but progresses to a more dangerous form.

The enlargement which occurs in simple goiter may be accompanied by a mild degree of hypothyroidism, or underactivity. The enlargement represents an effort to manufacture more adequate amounts of thyroxine.

Simple goiter begins with a lessening in the amount of iodine in the colloid and an increase in the size and number of the thyroid cells. The first stage is called parenchymatous goiter. "Parenchyma" means the essential or functional part of an organ. As seen in the thyroid structure, the factory or working part is composed of the thyroid epithelial cells. When hyperplasia or abnormal multiplication of thyroid cells spreads evenly through the whole gland, the resulting goiter is symmetrical, and firm. Parenchymatous goiter may go on to a complete exhaustion, or wearing out of the cells. Or the increasing process may stop, and the follicles become filled with colloid.

When the latter happens, a colloid goiter results. Colloid goiters are usually symmetrical and somewhat soft. They may be very large, because each of the many additional follicles becomes distended with colloid. The total quantity of iodine in the entire gland may be close to normal, but because of the enlarged size, the ratio of iodine per gram of gland tissue is low.

Another kind of goiter is called an adenomatous or nodular goiter. Either parenchymatous or colloid goiter may gradually change to

adenomatous goiter, which is the commonest type of goiter after the age of 30. Asymetrical, or uneven, bulges or nodules form. They may increase in size from that of cherry stone to plum stone or larger.

Simple goiter is so called because it does not cause any toxic or poisoning symptoms. Its importance from a medical standpoint is due to the fact that nodular or adenomatous goiter may frequently have its origin in a preexisting colloid goiter, and when this occurs nodular goiter may subsequently become toxic or poisonous; also, symptoms due to pressure on neighboring structures such as the windpipe may occasionally be bothersome in patients with colloid goiter. From a health standpoint, colloid goiter is completely preventable by taking a small but adequate amount of iodine in the food regularly. Where iodized salt is used from infancy, simple goiter, with very few exceptions, is avoided.

Goiters Associated With Hormone Deficiency

Cretinism

A cretin is a child who is dwarfed by lack of sufficient thyroid secretion during fetal life. A similar but less severe condition, myxedema, may occur by the development of an insufficiency of thyroid secretion which occurs at any time after birth. Cretins, in the past, were found in districts where goiter was common. Among these areas are the Himalayas, the Pyrenees, the Alps, the Andes, South America, and the Great Lakes and St. Lawrence regions and northwestern States in North America. So many of these unfortunates were found in certain localities in the Alps that government aid was necessary to support them. However, cretins do appear occasionally in all these areas.

In cretins, the mental, physical and sexual development is greatly retarded. If these cretin dwarfs live to adulthood, they retain their childhood body build, and may not mature sexually. If untreated, their mentality may be arrested at a low level, making them unable to support themselves. The metabolism is very low, the skin has a typical dry, thick appearance, and deaf mutism is common. At autopsy, abnormal or very small thyroid glands are found.

If thyroid extract is given to cretins at an early age, marked improvements result but complete recovery does not always occur. Cretinism should be prevented by assuring an adequate supply of iodine for the mother before and during pregnancy.

Myxedema

When destruction or degeneration of the thyroid gland occurs at any time after birth the hypothyroid condition called myxedema

results. Myxedema can be produced in animals by removal of the thyroid gland. Sir William Gull of England in 1874 described the defects in his patients which were associated with degeneration of the thyroid. Gull noticed several effects of hypothyroidism. A loss of mental and physical vigor; dry, brittle hair; an apathetic, lethargic reaction to mental stimuli; and a peculiar thickening of the skin are typical. Today we know by basal metabolism tests that a low metabolic rate exists. The thickening of the skin was thought to be due to the deposit of mucin, and the word myxedema means mucous swelling. Recent study indicates that the deposit is a semifluid albuminous substance, about like egg white.

The outlook for the adult with myxedema is hopeful today. Three months of administration of thyroid extract make a dramatic improvement. Thyroid extract will control the symptoms of myxedema entirely, and keep the patient in good health.

Hyperthyroidism

Increased function, called an overactive, or hyperactive state, may occur in the thyroid gland. Some unknown factor, perhaps a severe emotional shock, or an infection, may start a hitherto normal thyroid on a mad race to produce thyroid hormone. Perhaps an interruption in the amicable relations existing in the pituitary-thyroid axis is the direct cause. But if something in the pituitary starts the thyroid into trouble, that something has yet to be explained.

Hyperthyroidism, or toxic goiter, may begin in a previously healthy individual with enlargement of the gland and simultaneous poisoning symptoms of rapid pulse, palpitation, tremor, nervousness, restlessness and irritability. This type of toxic goiter is called primary or exophthalmic goiter, or Graves' disease.

A severe primary toxic goiter may soon be accompanied by a pop-eyed condition, medically called exophthalmos. The metabolic rate goes up, perhaps as high as 80 percent or more above normal, and with rapid burning of fuel goes a rapid loss in weight. The animation increases to an abnormal nervousness which becomes very trying to the patient and everyone about. There may be difficulty in breathing upon exertion and severe heart symptoms. Fortunately, various methods of cure for exophthalmic goiter are known today.

Another type of toxic goiter is called secondary, because it follows a simple goiter as a complication. Usually hyperthyroidism does not occur until after an average of 15 years of simple goiter. The pop-eyed, or exophthalmic, condition does not occur and the onset is more gradual than in exophthalmic goiter. The heart shows signs of poisoning by a rapid pulse and the metabolic rate soars. The simple adenomatous goiter becomes a toxic adenomatous goiter for unknown

reasons. The tragedy of toxic adenomatous goiter lies in its preventability by known methods. If we avoided simple goiter, through adequate iodine intake, we would have no secondary toxic goiter.

Iodine, and Its Role in Normal and Abnormal Thyroid

In reviewing the thyroid gland and its function, recall how the thyroid cells took the iodine from the blood as an iodide and manufactured the thyroid hormone from it for body use or for storage. When the body is given more iodine than it needs from a diet exceptionally rich in seafood, the excess passes out in the normal person without any effect on the body.

But some entirely different situations can produce an iodine hunger in the body, and then unfortunate results follow. One situation is lack in the diet of the minimum iodine requirement.

Another situation is temporarily increased demand for iodine, which may make a previously sufficient iodine supply dangerously inadequate. The well-known situations of increased demand are puberty, pregnancy, and lactation. Since the thyroid hormone is closely associated with the gonads, or sex glands, it is natural that sexual development should make an increased call for thyroid hormone, which only can be met with iodine.

Since pregnancy is the growth period for the expected baby, a similar special demand for thyroid hormone is logical. Many obstetricians today are giving additional iodine to all their pregnant patients.

Because lactation, or the period of nursing a baby, is also a period of supplying growth for an individual, a logically extra demand for thyroid hormone occurs at this time. Proof of the need for extra iodine is seen in the enlargement of the thyroid which often exists in puberty, pregnancy, and lactation. Infections, poor diet, and poor sanitation also may make additional demands for iodine. Certain foods, notably members of the cabbage family, if taken in abnormal quantities, may do the same, and it is possible that they may cause goiter if the supply of iodine is small.

Drs. Curtis and Fertman have found that normal adults confined in bed on a monotonous diet required approximately 1 microgram of iodine per kilogram of body weight per day. An additional 2 micrograms daily are needed to take care of ordinary activities with some for reserve. Taking all needs into consideration the Food and Nutrition Board of the National Research Council gives the daily requirement of iodine for an adult as 0.15 to 0.30 milligrams and states that this need can be met by the regular use of iodized salt. They call attention to the special importance of its use in adolescence and pregnancy.

When the single layer of flat or cuboidal cells around the edge of the thyroid follicles (see figure) are offered enough iodine for their manufacturing needs, they sit quietly in their places like decent diners at a good home or restaurant. But when the amount of iodine is scanty, either from lack of iodine in the diet or because of special demands, a wild boarding-house grab ensues. Each epithelial cell seems to be stretching for all the possible iodine it can capture from the diminishing colloid supply. The cells change from their normal shape to an elongated, columnar shape. This hypertrophy, or overgrowth of individual cells, is soon followed by a hyperplasia or increase in the total number of cells. If a necessary food were suddenly rationed, a protective mother might call all her children and rush the whole family to the store to get as much as possible. These two changes in the thyroid, the stretching out of the individual cells, and the increase in the total number of cells, can be seen under the microscope.

When the rationing is over, either because the special demand ceases, or the diet is improved by additional iodine, the rush stops, but the thyroid gland never is quite the same again. For all practical purposes, the gland will function normally, and may return to its normal size. But the involution, or return to normal, is really a resting or colloid state. A woman who eats just enough food iodine for usual living may have a series of thyroid enlargements with each pregnancy.

The Subclinical Picture

It is easy for individuals to look the other way if they do not recognize that the iodine problem is their own problem. Many people who take vitamin tablets and are careful about getting an adequate supply of vitamins neglect the iodized salt which will insure a health minimum of iodine for the normal person. It has been seen how the thyroid secretion with its essential iodine affects growth, health, a normal skin, and an alert mentality. Doctors have found, in practicing obstetrics, that even where goiters were not involved, the giving of extra iodine decreased the number of miscarriages and increased the number of mothers who had an adequate milk supply. How much fatigue of the adolescent may be due to iodine-hunger is only a guess.

With today's emphasis on positive health, many medical authorities are actively endorsing the use of food iodine, as a simple, cheap, easy insurance against the possible handicaps of a subclinical iodine deficiency.

Why Iodine May Be Inadequate in Diets

From ancient times, goiter has been known to exist in certain regions. Endemic is a word used to describe a condition which exists all the time in a certain place. The draft boards of World War I found two

endemic goiter areas in the United States, one centering around the Great Lakes Region, and the other in the Pacific Northwest. In areas where endemic goiter exists, the soil, water, and vegetation are poor in iodine. Early opinion pointed a finger of warning at certain supplies of drinking water. Analysis of drinking water in United States cities shows a wide variation in iodine content, from 0.01 micrograms per kilogram (γ/kg. or parts per billion) in Duluth, Minn., and Spokane, Wash., to 73.30 γ/kg. in San Dimas, Calif.

The iodine content of plants can be increased by adding iodine-containing salts to the soil, and the iodine content of milk can also be increased by feeding suitable rations to the cow. Such practices have been considered and have been declared to be utterly impractical in meeting the goiter problem. They are too inefficient, uneconomical, and difficult to put into operation on a national scale.

Seafood is a good source of iodine, although the iodine content varies with the variety and with the iodine content of the sea water from which it comes. Seafood-eating people, even in a goitrous area, are remarkably free from goiter.

Certain sea weeds such as kelp have a very high iodine content, and dried preparations in the form of tablets or powder have been widely promoted for their health value. These products have no important nutritive value other than that of the iodine they contain. While it may be possible to adjust the intake of these products so as to provide for a suitable uniform supply of iodine, the requirements for this element can be more easily and safely met by the use of iodized salt.

Some natural salt deposits contain iodine, but others do not. A dramatic demonstration of man's accidental conversion of a naturally healthy area into a goitrous area occurred in the Kanawha River Valley of West Virginia. Dr. O. P. Kimball reported the change which took place. Prior to 1900, goiter was exceedingly rare, according to local physicians. Prior to this date, the table salt came from local salt wells. It was a crude, coarse salt with brown particles. After 1900 a sparkling white salt, which the people preferred, was shipped in. This white salt contained no iodine, but it pushed the crude salt off the market. During the next quarter of a century, the goiter rate rose sharply. By 1922, a goiter survey showed that about 60 percent of adolescent girls in that Valley had goiter.

Repeatedly, civilized man has demonstrated that he is technologically ahead of his own welfare. But after harming himself, he often works out the cure. The classic story of the polishing of brown rice into white rice is a good example. The loss of thiamine (vitamin B_1) caused the development of the deficiency disease, beriberi, among those using white rice as a large item of diet. Prevention and cure were found in eating the rice polishings, or the unpolished brown rice.

Similarly, whole grain bread was robbed of iron and vitamins when white flour became popular. Now we are putting back some of the health-giving properties of the whole grain by "enriching" our white flour with several vitamins and iron.

A similar situation has happened with salt. When processing of salt became a national industry, the local salt deposits which contained iodine were no longer used. The majority of our salt today comes from iodineless sources. Even in processing sea salt, the iodine is removed. To some extent, modern progress has neutralized the lack of iodine in commercial salt by refrigerated shipping of seafood to the interior parts of our country. But everyone does not eat fish frequently. Shipping of canned and fresh frozen vegetables and fruits from regions where the soil is rich in iodine has helped to relieve the goiter problem. However, the shopper in the city grocery has no idea whether the vegetables and fruits she buys are rich in iodine or deficient in it.

Incidence of Goiter and Relation to Iodine

Because individuals cannot tell whether their natural supply of iodine is adequate, some plan of giving everyone the food equivalent of iodine has been tried in many parts of the globe for many years. The most popular and most practical way has been to add an infinitesimal (0.01 percent) amount of necessary iodine to table salt.

The name iodized salt came into use more than 25 years ago for table salt containing iodine equivalent in amount to that which would result from adding 0.02 percent of sodium or potassium iodide to ordinary table salt. About a decade ago it was demonstrated that the addition of small quantities of certain substances would greatly retard the loss of iodine that sometimes occurs in packaged iodized salt. Use of these so-called stabilizers has made it possible to reduce the quantity of iodide from 0.02 to 0.01 percent of the salt with assurance that the use of such salt will provide an adequate intake of iodine.

Since iodine occurs in nature in some sources of salt, iodized salt is properly regarded as a natural food. It is an improved salt.

Goiter occurs throughout the world, wherever the supply of iodine is inadequate. A goiter map of Europe was made in 1883, and McCarrison and Eggenberger have prepared maps showing world-wide goiter conditions.

To counteract this goiter prevalence from iodine deficiency, Boussingault in 1831 suggested that iodized salt be sold by the government of Colombia, South America, to prevent goiter. The use of iodine-containing sea salt or the addition of potassium iodide to rock salt was advocated in 1855 by Kostl.

Dr. O. P. Kimball of Cleveland, Ohio, has told of his personal experience with the effect of iodized salt on goiter incidence in Michigan. In 1924, the salt manufacturers agreed to manufacture an iodized salt, and the Wholesale Grocers' Association agreed to handle only iodized salt for table use in Michigan. Michigan lies in the Great Lakes goiter belt. At the time iodized salt was started, a survey placed the incidence of goiter in Michigan at 38.6 percent. A reexamination for goiter was made in 1928 after 4 years of using iodized salt. The incidence of goiter was found to have decreased to 9 percent.

Even more startling proof of the importance of food iodine in salt came from Calumet, Mich. During the depression, approximately two-thirds of the families in this copper-mining community were on relief. Relief officials endeavored to save money by buying bag salt (noniodized) for those on relief. The result was an upshoot in the goiter rate, occurring only in the families using the iodine-lacking salt. Dr. Kimball reported that of children not using iodized salt 60 percent had goiter, and in the same community of those who had remained on iodized salt only 3 percent had goiter.

The safety factor in administering food iodine has been the object of research. Health authorities never advocate self-diagnosis or self-administration of medicine. Treatment of such diseased conditions as toxic goiter is the duty of the physician. Because large amounts of iodine have conspicuous effects upon goiter, studies have been made to assure the toxic goiter patient and his physician that the tiny preventive amounts of food iodine in iodized salt will be safe for the sufferer from toxic goiter. Dr. Kimball personally investigated stories of persons who had complained of iodized salt having caused toxic goiter or other toxic manifestations. He was not able to find any untoward effects from the use of iodized salt.

In 1945 and 1946, the Public Health Service made limited surveys of goiter incidence. They report "Although the population groups that were studied in Florida and Georgia were not in the so-called 'goiter belt', the prevalence of enlarged thyroid was high in both white and negro family groups. In Mitchell County, Ga., 31.3 percent of white women and 8 percent of the males had an enlarged thyroid gland. In Alachua County, Fla., 25.6 percent of the Negro females between 13–20 years of age were affected."

Goiter is a problem in the United States, today. Simple goiter may be prevented by eating food iodine. The use of iodized salt is the most effective way of combating this important public health problem.

Authorities advocating table use of iodized salt are: Forty-fifth Annual Conference, State and Territorial Health Officers with Surgeon General, Public Health Service; Study Committee on Endemic Goiter of the American Public Health Association; Council on Foods and Nutrition of the American Medical Association; Surgeon General, Public Health Service; Food and Nutrition Board of the National Research Council; Medical Research Council, Great Britain, Special Goiter Subcommittee; International Goiter Conference, held in 1927 and 1928.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED AUGUST 6, 1949

A total of 2,449 cases of poliomyelitis was reported (an increase of 25 percent), as compared with 1,961 last week, a 5-year (1944–48) median of 932, and 1,237 for the corresponding week last year (an increase of only 2 percent). Weekly increases continued in that year, with one exception, until the week ended September 18, when the peak of incidence was reported. The highest incidence was reported earlier, however, in 10 of the past 22 years. During the current week declines were recorded in the West North Central and South Central areas. Current totals (last week's figures in parentheses) for the 4 areas reporting 75 percent of the week's total are as follows: Middle Atlantic 500 (244), East North Central 645 (489), West North Central 427 (509), West South Central 264 (270). States reporting currently more than 14 cases each are as follows: *Increases*—Maine 21 (15), Massachusetts 82 (33), Connecticut 32 (14), New York 390 (200), New Jersey 81 (27), Pennsylvania 29 (17), Ohio 99 (65), Indiana 96 (83), Illinois 250 (145), Wisconsin 53 (47), Minnesota 94 (91), Iowa 84 (83), North Dakota 48 (18), Nebraska 31 (23), Virginia 27 (13), West Virginia 26 (24), Mississippi 22 (12), Texas 121 (95), Idaho 33 (30), Colorado 33 (21), Washington 24 (16), California 112 (87); *decreases*—Michigan 147 (149), Missouri 110 (194), Kansas 46 (68), Kentucky 35 (47), Tennessee 36 (48), Arkansas 64 (73), Oklahoma 75 (96). A total of 10,743 cases has been reported for the year to date, as compared with 7,030 for the same period last year and a 5-year median of 3,992.

Of 30 cases of Rocky Mountain spotted fever (last week 40, 5-year median 40), 26 occurred in the South Atlantic and South Central areas (11 in Virginia, 5 in North Carolina, 4 in Kentucky), 2 in Pennsylvania, and 1 each in New Jersey and Utah.

During the week, 2 cases of anthrax were reported, in New York.

Deaths recorded during the week in 93 large cities in the United States totaled 8,829, as compared with 8,913 last week, 8,261 and 8,937, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,242. The total to date is 289,680, as compared with 291,322 for the corresponding week last year. Infant deaths totaled 736, last week 688, 3-year median 675. The cumulative figure is 20,115, same period last year 20,858.

Telegraphic case reports from State health officers for week ended August 6, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	---	---	---	15	---	---	21	---	3	---	---	---	15	---
New Hampshire	---	---	---	---	---	---	9	---	---	---	---	---	3	---
Vermont	---	---	---	11	---	---	7	---	---	---	---	1	---	---
Massachusetts	8	1	---	40	---	---	82	---	12	---	---	1	112	---
Rhode Island	---	---	---	5	1	4	7	---	---	---	---	2	1	---
Connecticut	---	---	---	24	1	24	32	---	2	---	---	---	43	---
MIDDLE ATLANTIC														
New York	3	2	(c)	186	3	116	390	---	[d] 40	---	---	4	235	13
New Jersey	1	2	1	116	2	42	81	1	7	---	1	2	102	---
Pennsylvania	2	1	(c)	102	8	---	29	2	13	---	---	3	129	1
EAST NORTH CENTRAL														
Ohio	2	---	1	97	1	43	99	---	26	---	1	15	123	8
Indiana	5	1	34	7	---	5	96	---	3	---	---	4	5	10
Illinois	---	1	1	104	2	82	250	---	5	---	---	3	163	1
Michigan [a]	4	1	3	59	---	5	147	---	16	---	---	2	63	2
Wisconsin	---	2	12	161	---	1	53	---	---	---	---	---	85	---
WEST NORTH CENTRAL														
Minnesota	2	---	---	11	1	19	94	---	1	---	---	---	---	1
Iowa	---	2	---	5	---	---	84	---	---	---	---	---	6	2
Missouri	2	---	1	1	4	4	110	---	1	---	2	6	8	---
North Dakota	---	5	---	14	1	---	48	---	1	---	---	---	---	---
South Dakota	---	---	---	2	4	1	14	---	1	---	---	---	1	---
Nebraska	---	---	5	8	---	1	31	---	11	---	---	---	12	---
Kansas	1	---	18	5	---	5	46	---	2	---	---	1	9	---
SOUTH ATLANTIC														
Delaware	---	---	---	1	1	---	3	---	---	---	---	---	4	---
Maryland [a]	---	---	2	10	---	28	14	3	2	---	---	1	29	---
District of Columbia	---	---	---	10	1	10	4	---	---	---	---	---	3	---
Virginia	1	---	79	66	1	31	27	11	3	---	1	5	42	2
West Virginia	1	---	18	5	1	3	26	---	3	---	---	4	26	---
North Carolina	7	---	---	13	---	---	11	5	4	---	---	3	10	---
South Carolina	3	---	38	10	1	18	1	---	2	---	---	3	5	2
Georgia	11	2	17	26	3	122	13	---	3	---	---	5	5	7
Florida	2	---	---	12	---	6	18	---	3	---	---	2	---	2

Telegraphic case reports from State health officers for week ended August 6, 1949—Continued

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
EAST SOUTH CENTRAL														
Kentucky	5			3	3	4	35	4	8			13	26	8
Tennessee	2		3	3		31	36	1	12		1	7	26	
Alabama	3		2	42	2	10	6		3			11	7	6
Mississippi [a]	7		1	9		22	22		1		2	7	2	
WEST SOUTH CENTRAL														
Arkansas	1		29	9		9	64		3		14	6	24	
Louisiana	1		1			10	4					6		
Oklahoma	1		11	6		7	75	1				3	8	4
Texas	8	1	208	85	8	194	121	1	8		1	6	118	13
MOUNTAIN														
Montana				7			5		1					
Idaho			2	8		3	33		[d] 3			2	2	
Wyoming				1	1		9				3	1		
Colorado			7	26	1	10	33		3			2	6	
New Mexico				10		3	11		1					
Arizona	1		11	4		4	6		2				7	1
Utah [a]				32		2	8	1	2				56	
Nevada				1			2							
PACIFIC														
Washington				32	1		24		13				15	
Oregon				13		7	6				5		21	
California	2	1	3	109	5	10	112		[d] 21			5	100	1
Total	86	22	508	1,526	57	899	2,449	30	218		31	136	1,096	
Median, 1944–48	190	19	489	1,387	57		932	40	673	1	20	165	2,519	
Year to date 31 weeks	4,134	333	70,375	585,374	2,250	54,139	[1] 10,743	377	58,007	39	758	2,047	35,106	
Median, 1944–48	6,823	294	190,086	545,980	4,331		3,992	335	85,740	261	595	2,241	60,231	
Seasonal low week ends	(27th) 9 July		(30th) 31 July	(35th) 4 Sept	(37th) 18 Sept		(11th) 19 Mar		(32d) 14 Aug	(35th) 4 Sept		(11th) 19 Mar	(39th) 2 Oct	
Since seasonal low week	366		508	637,767	3,004		[1] 9,820		80,705	49		1,587	45,139	
Median, 1943–48 [b]	669		489	580,926	5,835		3,729		124,311	344		1,766	87,590	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for diphtheria, influenza, poliomyelitis, and typhoid fever the corresponding periods are 1944–45 to 1948–49.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately, as follows: Rhode Island 2, Ohio 6, Virginia 1, South Carolina 2, Georgia 2, Florida 1, Kentucky 2, Alabama 1, Louisiana 1, Colorado 2, California 4. Cases reported as Salmonella infection, not included in the table, were as follows: New York 2.
Leprosy: Week ended July 30, Texas 1. *Relapsing fever*: Week ended July 30, Texas 4. *Anthrax*; New York, 2.
[1] Correction: Florida—Week ended Jan. 22, 4 cases (instead of 5); week ended July 30, 7 cases (instead of 8).
Hawaii Territory: Measles 12, poliomyelitis 1. Alaska: Influenza 1, pneumonia 4.

PLAGUE INFECTION IN LOGAN COUNTY, KANS., AND SWEETWATER COUNTY, WYO.

Under dates of August 5 and 3, respectively, plague infection was reported proved in a pool of 99 fleas from 8 prairie dogs, *Cynomys ludovicianus*, shot July 22 on a farm 8 miles south and 5 miles west of Russell Springs, Logan County, Kans., and in a pool of 38 fleas from 32 white footed mice, *Peromyscus maniculatus*, trapped July 9 at a location 5 miles northeast of Rock Springs, Sweetwater County, Wyo., on U. S. Highway 30.

This is believed to be the first demonstration of plague infection in Sweetwater County, Wyo.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended July 16, 1949.—During the week ended July 16, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		47		56	109	23	85	41	44	405
Diphtheria				9	1					10
Dysentery, bacillary				4						4
Encephalitis, infectious							1			1
German measles		2		22	8	3	20	34	3	92
Influenza		32			5	1				38
Measles		12		235	126	62	256	80	180	951
Meningitis, meningococcal		1								1
Mumps		23		22	63	9	1	4	13	135
Poliomyelitis		1		12	23	1	1		10	48
Scarlet fever		2		12	8	3		10	4	39
Tuberculosis (all forms)		1	6	82		24	18		108	239
Typhoid and paratyphoid fever				11			2		9	22
Undulant fever				2						2
Venereal diseases:										
Gonorrhea		10	11	77	63	30	11	29	84	315
Syphilis		4	4	83	45	8	5	2	13	164
Other									1	1
Whooping cough		2		85		7	2		1	97

Newfoundland cases: Diphtheria, 1; gonorrhea, 4; syphilis, 5.

FINLAND

Notifiable diseases—May 1949.—During the month of May 1949, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	9	Poliomyelitis	8
Diphtheria	98	Scarlet fever	302
Dysentery	5	Syphilis	72
Gonorrhea	623	Typhoid fever	16
Paratyphoid fever	319		

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-May 1949	June 1949	July 1949—week ended— 2	9	16	23	30
ASIA							
Burma	190	38	5	6			
Bassein	128	36	5	6			
Moulmein	2						
Rangoon		2					
Ceylon:							
Trincomalee	1	1					
China:							
Amoy				[1] 1			
India	47,479	5,832	1,438	945	818		
Allahabad	5						
Bombay	[2] 1	[2] 2			[2] 1		
Calcutta	3,969	221	62	63	67	56	
Cawnpore	45	58	11	2	5	5	
Cocanada						1	
Cuddalore	2						
Lucknow	20	5	4	2			
Madras	57	19	19	18	16	34	
Masulipatam		1					
Nagpur					1		
Negapatam	26						
New Delhi		[3] 2	2		7	3	
Raj Samand	10	30					
Tuticorin	14						
India (French):							
Karikal	55						
Pondicherry	100						
Indochina (French):							
Annam	53						
Cambodia	34	8					
Cochinchina	4	6					
Pakistan	20,696	[4] 722		2	1		
Chittagong	63	8		2	1		
Dacca	90	2					
Lahore	11						
Siam	8	1					
Bangkok	8						

[1] Suspected. [2] Imported. [3] Includes imported cases. [4] Preliminary figures.

PLAGUE*

(Cases)

AFRICA							
Basutoland	36						
Belgian Congo	6	1	2	1	1		
Costermansville Province		1	1				
Stanleyville Province	6		1	[1] 2	1		
British East Africa:							
Kenya	2	2	1				
Tanganyika	15						
Madagascar	64	2					
Tananarive	3						
Rhodesia, Northern	2						
Union of South Africa	[3] 33	3	1	[2] 9	1	[2, 3] 6	
ASIA							
Burma	[4] 404	1	1				
Mandalay	1						
Moulmein	[5] 6						
Rangoon	[4] 5	1	1				

See footnotes at end of table.

PLAGUE—Continued

Place	January-May 1949	June 1949	July 1949—week ended—				
			2	9	16	23	30
ASIA—continued							
China:							
Chekiang Province	7						
Wenchow	7						
Fukien Province	20						
Kiangsi Province	9						
India	24,293	369	[6] 73	[6] 151	[6] 63	[7] 9	
Indochina (French)	84	3					
Annam	17	1					
Cambodia	20						
Cochinchina	29	2					
Laos	3						
Java	5	1					
Siam	151	1					
EUROPE							
Portugal: Azores	4						
SOUTH AMERICA							
Peru:							
Lambayeque Department	7						
Lima Department	3						
Piura Department	6						
Venezuela:							
Aragua State	1						
OCEANIA							
Hawaii Territory: Plague infected rats [8]							

[1] Pneumonic plague. [2] Includes suspected cases. [3] In Cape Province, distributed as follows: Smuts Farm, Kuruman District, 1 case (suspected); Boskop Farm, Gordonia District, 2 cases (1 fatal); Glen Aden and Hemelstraat 3 cases (1 fatal). [4] Includes imported cases. [5] Corrected figure. [6] Preliminary figures. [7] In Calcutta only. [8] Plague infection has been reported in Hawaii Territory as follows: On Mar. 12, 1949, in a mass inoculation of 2 pools of tissue from 10 rats (8 and 2), taken on Maui Island; on Mar. 16, 1949, in mass inoculation of 3 pools of 29 fleas (7, 12, and 10) from rats trapped on the Island of Hawaii.

*During the period July 23–Aug. 6, 1949, 2 cases of bubonic plague were reported in the State of New Mexico in the United States—1 case in Taos County and 1 case in Sandoval County.

SMALLPOX

(Cases)

(P=present)

AFRICA							
Algeria	112						
Angola	[1] 327						
Belgian Congo	941	48					
British East Africa:							
Kenya	22	2					
Nyasaland	772	90	8	10			
Tanganyika	271						
Uganda	32						
Cameroon (British)	10						
Cameroon (French)	52	9					
Dahomey	228	42			[2] 10		
Egypt	3						
Eritrea	1						
Ethiopia	4						
French Equatorial Africa	21	48					
French Guinea	1						
French West Africa: Haute Volta	72	36			[2] 10	[2] 1	
Gambia	51	3		[4] 4			
Gold Coast	[5] 17						
Ivory Coast	194	17			[2] 32	[2] 8	
Morocco (French)	8						
Mozambique	111	16					
Nigeria	6,087	594	[6] 3	[6] 15			
Niger Territory	405	[7] 6					
Portuguese Guinea	1						
Rhodesia:							
Northern	4	1					
Southern	223	53					
Senegal	16						
Sierra Leone	101	[7] 6					

See footnotes at end of table.

SMALLPOX—Continued

Place	January-May 1949	June 1949	July 1949—week ended— 2	9	16	23	30
AFRICA—continued							
Sudan (Anglo-Egyptian)	[8] 67	[1] 64	12	4	16	--------	--------
Sudan (French)	151	[7] 1	--------	--------	--------	--------	--------
Togo (French)	64	40	--------	--------	[2] 26	--------	--------
Union of South Africa	190	P	P	P	P	--------	--------
ASIA							
Afghanistan	35	--------	--------	--------	--------	--------	--------
Arabia	[8] 35	[9] 3	--------	--------	--------	--------	--------
Bahrein Islands	[8] 45	1	--------	--------	5	--------	--------
Burma	1,365	[10] 15	[10] 6	[10] 6	[9] [10] 7	[9] [10] 7	--------
Ceylon	--------	[9] 1	--------	--------	--------	--------	--------
China	855	[11] 14	[11] 5	[11] 2	[11] 1	[11] 1	--------
India	48,607	4,626	[7] 1,082	[7] 520	[7] 301	--------	--------
India (French): Yanaon	1	--------	--------	--------	--------	--------	--------
India (Portuguese)	191	14	3	--------	--------	--------	--------
Indochina (French)	2,198	37	31	17	7	29	--------
Iran	197	[7] 24	[7] 3	--------	--------	--------	--------
Iraq	[8] 310	50	10	4	25	--------	9
Israel	[12] 3	--------	--------	--------	--------	--------	--------
Japan	95	19	1	4	1	--------	--------
Korea (Southern)	544	--------	--------	--------	--------	--------	--------
Lebanon	[8] 134	[7] 5	--------	--------	--------	--------	--------
Malay States (Federated)	43	--------	--------	--------	--------	--------	--------
Manchuria	--------	--------	--------	--------	[13] 9	--------	--------
Netherlands Indies:							
Java	[8] 4,413	1,100	319	321	186	245	--------
Riouw Archipelago	2	--------	--------	--------	--------	--------	--------
Sumatra	[8] 68	[8] 26	[9] 3	9	9	8	--------
Pakistan	2,909	[7] 141	--------	--------	--------	--------	--------
Philippine Islands:							
Mindoro Island	11	--------	--------	--------	--------	--------	--------
Romblon Province	[9] 4	--------	--------	--------	--------	--------	--------
Tablas Island	2	--------	--------	--------	--------	--------	--------
Portuguese Timor	4	--------	--------	--------	--------	--------	--------
Siam	37	--------	--------	--------	--------	--------	--------
Straits Settlements: Singapore	[8] 2	--------	--------	--------	--------	--------	--------
Syria	320	37	9	5	32	--------	--------
Transjordan	165	21	3	1	--------	2	--------
Turkey. (See Turkey in Europe)	--------	--------	--------	--------	--------	--------	--------
EUROPE							
Belgium	--------	1	--------	--------	--------	--------	--------
Great Britain: England and Wales	[8] 20	--------	--------	--------	--------	--------	--------
Italy	[14] 93	[15] 5	--------	--------	--------	--------	--------
Portugal: Lisbon	3	--------	--------	--------	--------	--------	--------
Spain	2	--------	--------	--------	--------	--------	--------
Canary Islands	6	--------	--------	--------	--------	--------	--------
Turkey	88	[7] 1	--------	--------	--------	--------	3
NORTH AMERICA							
Cuba: Habana	[8] 5	[9] 1	--------	--------	--------	--------	--------
Guatemala	1	--------	--------	--------	--------	--------	--------
Mexico	34	10	--------		--------	[16] 1	--------
SOUTH AMERICA							
Argentina	[1] 58	--------	--------	3	--------	--------	--------
Bolivia	[17] 35	--------	--------	--------	--------	--------	--------
Brazil	[1] 67	[16] 4	[16] 5	--------	[16] 1	--------	--------
Chile	[9] 2	--------	--------	--------	--------	--------	--------
Colombia	[1] 1,314	[1] 362	--------	--------	--------	--------	--------
Ecuador	[1] 450	51	--------	--------	--------	--------	--------
Paraguay	[9] 2	--------	--------	--------	--------	--------	--------
Peru	1,151	--------	--------	--------	--------	--------	--------
Venezuela	1,090	--------	--------	--------	--------	--------	--------
OCEANIA							
Guam	[18] 2	--------	--------	--------	--------	--------	--------

[1] Includes alastrim. [2] July 1–10, 1949. [3] July 11–20, 1949. [4] In Bathurst. [5] Jan. 1–15, 1949. [6] In Lagos. [7] Preliminary figures. [8] Includes imported cases. [9] Imported. [10] In ports only. [11] In Shanghai only. [12] Includes 1 case reported for week ended May 28, 1949, in Jerusalem. [13] At Port Arthur. [14] Includes 90 cases of varioloid reported in Rome Jan. 1–May 27, 1949. [15] Varioloid reported in Rome. [16] Alastrim. [17] Jan. 1–Feb. 15, 1949. [18] May 1–31, 1949.

TYPHUS FEVER*

(Cases)

(P=present)

Place	January-May 1949	June 1949	July 1949—week ended— 2	9	16	23	30
AFRICA							
Algeria	43						
Basutoland	7						
Belgian Congo	[1] 41						
British East Africa:							
Kenya	1						
Nyasaland		4					
Egypt	169	2	1				
Eritrea	40	10	4	1			
Ethiopia	336						
Gold Coast	1						
Libya	134	23			2		
Madagascar: Tananarive	[1] 6						
Morocco (French)	11	3					
Morocco (Spanish)	1	1					
Sierra Leone	[1] 1						
Tunisia	55	2					
Union of South Africa	[2] 53	P	P	P			
ASIA							
Afghanistan	1,395				(3)		
Arabia: Aden	[4] 2						
Burma: Rangoon	[5] 1						
Ceylon: Colombo	[1] 3	[1] 1					
China	25						
India	[4] 192	4					
India (Portuguese)	18	1					
Indochina (French)	6	4					
Iran	123	7					
Iraq	[1] 26	3		3	1	1	7
Japan	83	5	1		2		
Korea	142						
Lebanon	[1] 1						
Pakistan	562	27	1				
Palestine	[6] 100						
Philippine Islands: Manila	[1] 1						
Straits Settlements: Singapore	[7] 2						
Syria	15	5			1		
Transjordan	50	3	2		1		
Turkey. (See Turkey in Europe.)							
EUROPE							
Belgium	1	[8] 4					
Bulgaria	305	40	4	3	6		
Czechoslovakia	17	3					
France	2	2					
Great Britain: Island of Malta	[1] 4				[1] 1		
Greece	[2] 26	5		1			
Hungary	17	3					
Italy	27	[1] 2					
Sicily	13						
Poland	210	11					
Portugal: Lisbon	4						
Rumania	417						
Spain	2						
Turkey	109	13	4	3	3	3	
Yugoslavia	130	26					
NORTH AMERICA							
Bahama Islands: Nassau		[1] 1					
Costa Rica [1]	15	1					
Cuba [1]	3						
Guatemala	13	14					
Jamaica [1]	6	4	4				
Mexico [2]	78	11	4	6	6		
Panama Canal Zone [1]	5	1					
Puerto Rico [1]	10	10	1	3	2	1	
SOUTH AMERICA							
Argentina [1]	1						
Bolivia	53						
Brazil	2						
Chile [2]	108	16	2	2	6		
Colombia [2]	1,178	266					

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January-May 1949	June 1949	July 1949—week ended—				
			2	9	16	23	30
SOUTH AMERICA—continued							
Curacao [1]	4	1					
Ecuador [2]	122	48					
Peru	306						
Venezuela [1]	23	2					
OCEANIA							
Australia [1]	66	16					
Hawaii Territory [1]	3	1					1

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.
[1] Murine type. [2] Includes murine type. [3] Epidemic of louse-borne typhus fever reported in Afghanistan July 22, 1949. [4] Includes imported cases. [5] Apr. 1-30, 1949. [6] Approximate number reported in outbreak in villages in Hebron and Bethlehem districts in February 1949. [7] One case type unspecified, 1 case murine type. [8] Imported.

YELLOW FEVER

(C=cases; D=deaths)

Place		January-May 1949	June 1949	2	9	16	23	30
AFRICA								
Belgian Congo:								
Stanleyville Province	D	5						
Gold Coast	C	[1] 3	1		1	[1] 5	[2] 2	
Akwatia	C					3	[2] 1	
Birim District	C	[2] 2					[2] 1	
Komenda Village [3]	D	1						
Nkwanta Dunkwa Area	D				1			
Nyakrom	D					[2] 2		
Oseikrome Village [2]	D		1					
Nigeria:								
Lagos	D	[4] 2						
NORTH AMERICA								
Panama:								
Pacora	C	[5] 8						
SOUTH AMERICA								
Brazil:								
Amazonas State	D	1						
Para State	D	[6] 3						
Peru:								
Cuzco Department	D	[7] 1						

[1] Includes suspected cases. [2] Suspected. [3] Near seaport of Sekondi. [4] Cases admitted to Lagos Hospital from ship that arrived from two other ports in Nigeria—Warri and Burutu. [5] Reported Jan. 15, 1949. Date of occurrence Nov. 11–Dec. 30, 1948. Five cases, all fatal, confirmed; 3 suspected cases. [6] Includes 1 case reported for Apr. 12, 1949, at Santarem. [7] In Quincemil, Jan. 1–31, 1949.

DEATHS DURING WEEK ENDED JULY 30, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended July 30, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,945	8,338
Median for 3 prior years	8,338	
Total deaths, first 30 weeks of year	281,632	283,670
Deaths under 1 year of age	687	694
Median for 3 prior years	679	
Deaths under 1 year of age, first 30 weeks of year	19,429	20,212
Data from industrial insurance companies:		
Policies in force	70,309,590	70,988,876
Number of death claims	12,398	12,259
Death claims for 1,000 policies in force, annual rate	9.2	9.0
Death claims per 1,000 policies, first 30 weeks of year, annual rate	9.4	9.7

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 SEPTEMBER 2, 1949 NUMBER 35

TUBERCULOSIS CONTROL ISSUE NO. 43

IN THIS ISSUE

Editorial

Tuberculosis Beds in the United States

WHO Tuberculosis Program, 1950

X-ray Films, Screens, and Developers, IX

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

CONTENTS

	Page
Editorial. Robt. J. Anderson	1097
Tuberculosis beds in the United States. Eleanor Hanna and Stanley Glaser	1098
World Health Organization tuberculosis program for 1950	1117
Characteristics of commercial X-ray screens and films, IX. Willard W. Van Allen	1124

INCIDENCE OF DISEASE

United States:	
Reports from States for week ended August 13, 1949	1126
Plague infection in Park County, Colorado, and Thomas County, Kansas	1129
Territories and possessions:	
Hawaii Territory—Plague infection in fleas	1129
Panama Canal Zone—Notifiable diseases—June 1949	1129
Puerto Rico—Notifiable diseases—5 weeks ended July 29, 1949	1130
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended July 23, 1949	1130
India—Bombay—Poliomyelitis	1130
Madagascar—Notifiable diseases—May 1949	1131
New Zealand—Notifiable diseases—3 weeks ended May 21, 1949	1131
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Cholera	1131
Smallpox	1132
Yellow fever	1132
Deaths during week ended August 6, 1949	1132

This is the forty-third of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which appear in the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

Public Health Reports

Vol. 64 • SEPTEMBER 2, 1949 • *No. 35*

—Editorial—

In this issue of PUBLIC HEALTH REPORTS the Division of Tuberculosis presents a discussion of tuberculosis beds based chiefly on questionnaires sent to hospitals in order to prepare an annual Tuberculosis Bed Index. The authors compare four issues of the Index and discuss other statistics concerning tuberculosis beds.

The source of all the data in the Index is the hospitals and sanatoria themselves, and it is to the cooperation of individuals in each of the 605 reporting institutions that the completeness of the Index is due. To get the necessary information, a double post card questionnaire was sent to every hospital and sanatorium that could be located. Replies were received from a record 100 percent.

We know that most hospitals are understaffed and that it is a real effort for a busy administrator to find time to fill out even a short form like this. Yet the response was uniformly gracious and prompt. We think the completed Index will justify in general usefulness any inconvenience it may have occasioned.

Each year, as our list of tuberculosis hospitals grows, the Index becomes a more reliable census. The following article points out that our original sources for the names and addresses of hospitals with tuberculosis beds in the United States and Territories were such standard lists as those of the American Hospital Association, American Medical Association, and National Tuberculosis Association. But information volunteered by people in all parts of the country has increased the original lists with the names of many new or previously unlisted hospitals. Our readers can do us a great service if they will continue to let us know about new hospitals and sanatoria so that the Index may record every new development from year to year.

Again we want to thank all the people and institutions who have contributed information to this year's edition. We will be happy to receive comments, criticisms, and suggestions about the Index from them as well as from the other readers of PUBLIC HEALTH REPORTS.

ROBT. J. ANDERSON, *Medical Director,*
Chief, Division of Tuberculosis.

Tuberculosis Beds in the United States

By Eleanor Hanna, M. A. and Stanley Glaser*

The problem of obtaining hospitalization has been a subject of particular importance in the treatment and control of tuberculosis ever since Trudeau set forth his theory that a regimen of rest is the proper treatment of tuberculosis. In 1884 the opening of "The Little Red" at Trudeau, New York, with two beds (*1*) was the beginning in the United States of specific hospitalization for tuberculous persons.

At that time tuberculosis took a heavy toll. The population was about 55,000,000 (*2*), and at least 100,000 persons died of tuberculosis every year.[1] Yet there were only the two beds at Trudeau for treatment in the whole United States. By January 1, 1949, there were 103,819 tuberculosis beds (*3*) and 48,064 deaths (*4*).

In 1926, 42 years after the opening of "The Little Red" there were some 54,000 "civilian" beds for tuberculosis patients in all the States. Drolet at that time presented a comprehensive study of tuberculosis hospitalization to the twenty-second annual meeting of the National Tuberculosis Association (*5*), and in 1931, Jessamine Whitney, statistician for the National Tuberculosis Association, compiled another report (*6*) designed to obtain a 5-year comparison with Drolet's information. Her report in 1931 showed an increase of 20 percent in "civilian" beds, bringing the total to 64,377 beds. After adding the tuberculosis beds for Federal patients, the insane and prisoners, she arrived at a total for the United States of 82,974 beds. The ratio of tuberculosis deaths in 1931, which totaled 85,000, to the tuberculosis beds then existent, gave almost one bed per death, the standard then recommended.

The formulation of a standard for determining the number of tuberculosis beds necessary to care for the tuberculosis patients has long been a topic for the particular attention of committees of the National Tuberculosis Association, the American Trudeau Society, and others interested in evaluating community programs for the control of tuberculosis.

The standard of a given ratio between beds and deaths from tuberculosis, while not an efficient index in every way, has been used for many years because the factors required to compute the ratio are readily available. A conclusion drawn from the Framingham Demonstration, 1917–23, was that "one bed per death" might be enough

* Statisticians, Office of the Chief, Division of Tuberculosis, Public Health Service.

[1] The tuberculosis rate in 1900 was 194.6 per 100,000 population. Applying a minimum rate of 200 per 100,000 to a population of 55 million gives an estimate of 100,000 deaths from tuberculosis yearly.

to care for all tuberculous patients (7). In 1933, Henry D. Chadwick reported at the National Tuberculosis Association Annual Meeting that experiences in studying the tuberculosis problem in Detroit indicated that a standard of "two beds per death" was necessary (8). During the following years, this standard served many communities. Some communities, slightly below the standard but with a declining number of tuberculosis deaths, as time passed, met the standard automatically, even though the beds remained constant and the number of patients may even have increased.

In spite of this inconsistency, the standard is a rule-of-thumb method which has served to focus the attention of tuberculosis workers on the need for beds, and has given impetus to obtaining new beds in many communities. In January 1944, the American Trudeau Society approved a minimum standard of two and one-half beds per annual tuberculosis death and recommended an even higher standard of three beds per annual tuberculosis death (9). Subsequently, the Hospital Survey and Construction Act (August 13, 1946), included in its text the standard of two and one-half beds per tuberculosis death (10). Public Health Service regulations for grants-in-aid to the States under this law specify that the Federal allowance is to be no more than the amount necessary to bring the number of tuberculosis beds to 2.5 times the average number of annual deaths from tuberculosis in the State over the 5-year period from 1940 to 1944, inclusive.

The Tuberculosis Control Division,[3] Public Health Service, was created in July 1944, and one of its first tasks was to obtain an accurate count of the number of beds actually existing in the United States for treatment of tuberculosis. The Division of Hospital Facilities, organized in August 1946, assumed responsibility for the administration of the Hospital Survey and Construction Act, but the Division of Tuberculosis continued to collect data about the number of beds available for tuberculosis treatment, since these data were necessary for its program.

To gather these data the Division of Tuberculosis sent a post card questionnaire to every hospital known to care for tuberculosis and to all tuberculosis sanatoria. Every source was used to obtain as nearly complete a count as possible. The annual result of the effort has been the Index of Hospitals and Sanatoria with Tuberculosis Beds in the United States and Territories, the first edition of which contained information as of January 1, 1946.

In comparing the Index with other publications giving information about tuberculosis beds, fundamental differences between the various reports should be noted. The Index is an annual report, prepared by a Federal agency to which hospitals supply information voluntarily. It gives only the rated bed capacity as reported by the institution,

[3] Now called the Division of Tuberculosis.

shows the city and State in which each institution is located and lists every institution which replies, regardless of how few beds there are for tuberculosis. It does not evaluate the adequacy of either the beds or the services given. Data on the number of adequate beds in the United States are referred to in the last section, "The Construction Program."

The main reports which may be compared to the Index are the annual Hospital Number of the Journal of the American Medical Association, the Tuberculosis Hospital and Sanatorium Directory of the National Tuberculosis Association and the American Hospital Directory of the American Hospital Association. The names of some hospitals appear in all three sources but no single source shows as many specific locations of tuberculosis beds as does the Index.

The Journal of the American Medical Association reports annually the official list of all types of hospitals registered by the Association in accordance with standards formulated by the Association Council on Medical Education and Hospitals. Tuberculosis service is indicated, as well as type of ownership or control, number of beds, average census and the number of admissions. The number of hospitals listed is limited by the conditions imposed for obtaining registration.

The Directory of the National Tuberculosis Association classifies institutions by type of ownership. It gives the capacity, rates, type of person admitted and stage of disease admitted, diagnostic and treatment facilities, resident staff, out-patient service, and the name of the medical director. The last two editions of the Directory were published in 1942 and 1948.

The American Hospital Directory is published annually and is based on information obtained by questionnaire from hospitals and other available sources. The names of all institutional members of the American Hospital Association are included in the Directory as well as non-members. This source shows hospitals classified by type of ownership, type of hospital, and facilities such as occupational therapy department, social service department and X-ray diagnostic department. The number of beds, census, admissions, fixed assets, payroll, and personnel by name and title are also reported.

Analysis of the Index

Four editions of the Index have been prepared to date by the Division of Tuberculosis. A comparison of the totals for each edition follows:

	Rated Bed capacity			*Number of hospitals*		
Index as of	*Total*	*Local*	*Federal*	*Total*	*Local*	*Federal*
Jan. 1, 1946	86,429	86,429	Not obtained.	594	594	Not obtained.
Jan. 1, 1947	86,795	86,795	Not obtained.	574	574	Not obtained.
Jan. 1, 1948	84,925	84,925	Not obtained.	575	575	Not obtained.
Jan. 1, 1949	103,819	88,279	15,540.	726	605	121.

The institutions counted as "local" are the kind of institutions which, in the first three editions, were the entire subject matter of the Index. The local data give the rated beds capacity of State, city, county, district and private hospitals, hospitals of the Indian Service, and all hospitals in Alaska, Hawaii, and Puerto Rico. The Federal hospitals, included for the first time in the 4th edition of the Index, are Veterans Administration hospitals, for which the number of operating tuberculosis beds is shown; Naval hospitals, for which the number of beds occupied is shown; and Army hospitals, Public Health Service Marine hospitals, and Federal penitentiaries for all of which rated tuberculosis bed capacity is shown. There are 15,540 tuberculosis beds in these 121 Federal institutions, most of which are under the control of the Veterans' Administration. This article deals with an analysis of local tuberculosis beds only.

In order to obtain the local data which appear in the Index, this Division mails a post card questionnaire to all hospitals and sanatoria which offer tuberculosis service. The mailing list contains the names of hospitals which have previously participated and any new or old hospitals which were not previously listed. We have obtained information about unlisted tuberculosis hospitals from other hospital listings, from tuberculosis consultants of the Division of Tuberculosis, State tuberculosis control officers, the Division of Hospital Facilities, newspaper and magazine clippings, and many interested tuberculosis workers.

The post card questionnaire, figure 1, requests five items in addition to identifying information. The Index presents only the official rated tuberculosis bed capacity. The other items concerning occupancy, availability and construction have been used each year for administrative purposes. This article publishes for the first time an analysis of the questionnaire in full.

The item "official rated bed capacity" may differ in the report of the Index from the number of "beds" shown in other sources. Comparison of the Index with other sources shows that for most tuberculosis hospitals there is close agreement between "rated bed capacity for tuberculosis" and "beds." In other kinds of hospitals, on the other hand, the "rated tuberculosis bed capacity" shown in the Index may be considerably lower, particularly when the hospital is classified as "general" or as "general and tuberculosis." If tuberculosis is a sufficiently important part of the hospital's operations, the whole capacity of the hospital is likely to be reported for tuberculosis; on the other hand, if tuberculosis service comprises a relatively small part of the hospital's function, there is likely to be no mention of the number of tuberculosis beds. Some hospitals, dealing with tuberculosis among other types of service, may not have a definable rated tuber-

THE POSTCARD QUESTIONNAIRE

Budget Bureau No. 68-R245.3
Approval Expire 11-30-50

HOSPITAL City Tuberculosis Hospital CITY Small City
1728 New Haven Avenue STATE Illinois

Is this the official name and address of your organization? YES ☐ NO ☐

TUBERCULOSIS BEDS ONLY - AS OF JANUARY 1, 1949	NUMBER OF BEDS
1. OFFICIAL RATED CAPACITY. 1-1-49	
2. NUMBER OCCUPIED BY PATIENTS 1-1-49	
3. NUMBER NOT AVAILABLE FOR IMMEDIATE USE. 1-1-49 (Beds permanently or temporarily closed for whatever reason)	
4. NEW BEDS ACTUALLY UNDER CONSTRUCTION. 1-1-49	
5. NEW BEDS PROPOSED. 1-1-49	

REMARKS

PHS-697(TB
REV. 11 48

Signature of Reporting Officer

Budget Bureau No. 68-R24 .3
Approval Expires 11/30/50

In order that we may prepare an accurate current *Index of Tuberculosis Hospital Beds in the United States and Territories as of January 1, 1949* will you please supply us with the information requested on the attached card and return the card promptly to us? A copy of the Index will be sent to each respondent.

PHS-697(TB)
REV. 11-48

Figure 1.

culosis bed capacity, but rather a varying number of beds which are used for tuberculosis as required. Other variations between the Index and other sources occur because of different reporting bases, actual changes in the number of beds reported at different times and a variety of other reasons.

As might be expected, some hospitals did not supply all the information requested; seven did not answer the fundamental question—

rated tuberculosis bed capacity—and are assigned zero beds in the tables which follow.

In addition some hospitals did not report the number of beds "not available for immediate use" or the "number occupied by patients." Where the number of beds available or occupied was not stated by the hospital, even in response to follow-up inquiries, figures have been supplied by assuming that beds available were 90 percent and beds occupied were 80 percent of rated bed capacity. The following additions have been made in accordance with the above rule:

State	*Number of sanatoria*	*Rated bed capacity (given)*	*Beds available (estimated at 90 percent)*	*Beds occupied (estimated at 80 percent)*
Texas	1	11	10	9
Alaska	1	10	9	8
Puerto Rico	4	765	689	612

The tables which follow have been adjusted so that the number of institutions is the same in all tables, in spite of the fact that six institutions reporting did not supply all the information requested. The tables have footnotes showing where the differences are, so that the tables may be reconstructed on a different basis.

Table 1. *Use of tuberculosis beds in 605 hospitals, United States and Territories, Jan. 1, 1949*

Status of tuberculosis beds	Number of local beds	Percent of		
		Rated capacity		Beds available
1. Rated tuberculosis bed capacity [1]	88,279	100.0	100.0	
2. Beds available [2]	82,767	93.8		100.0
3. Beds not available [1]	5,512	6.2		
4. Beds occupied [1]	73,398		83.1	88.7
5. Beds not occupied [3]	14,881		16.9	
6. Beds available but not occupied [4]	9,369			11.3

[1] Data obtained from questionnaire, fig. 1.
[2] Arithmetical difference between line 1 and line 3.
[3] Arithmetical difference between line 1 and line 4.
[4] Arithmetical difference between line 2 and line 4.

Reports from 605 hospitals listed in the Index are analyzed in table 1. They show a total rated tuberculosis bed capacity of 88,279 in the United States and Territories as of January 1, 1949. Of these beds, 5,512 or 6.2 percent were closed either temporarily or permanently and therefore were not available for use. Beds are closed for such reasons as lack of personnel, remodeling programs, lack of operating funds and, in some States, lack of patients.

When the unavailable beds are subtracted from the total rated capacity, there remain 82,767 beds available to patients—93.8 percent of the total. On January 1, 1949, 73,398 of these—83.1 percent of the total rated capacity and 88.7 percent of the available beds—were

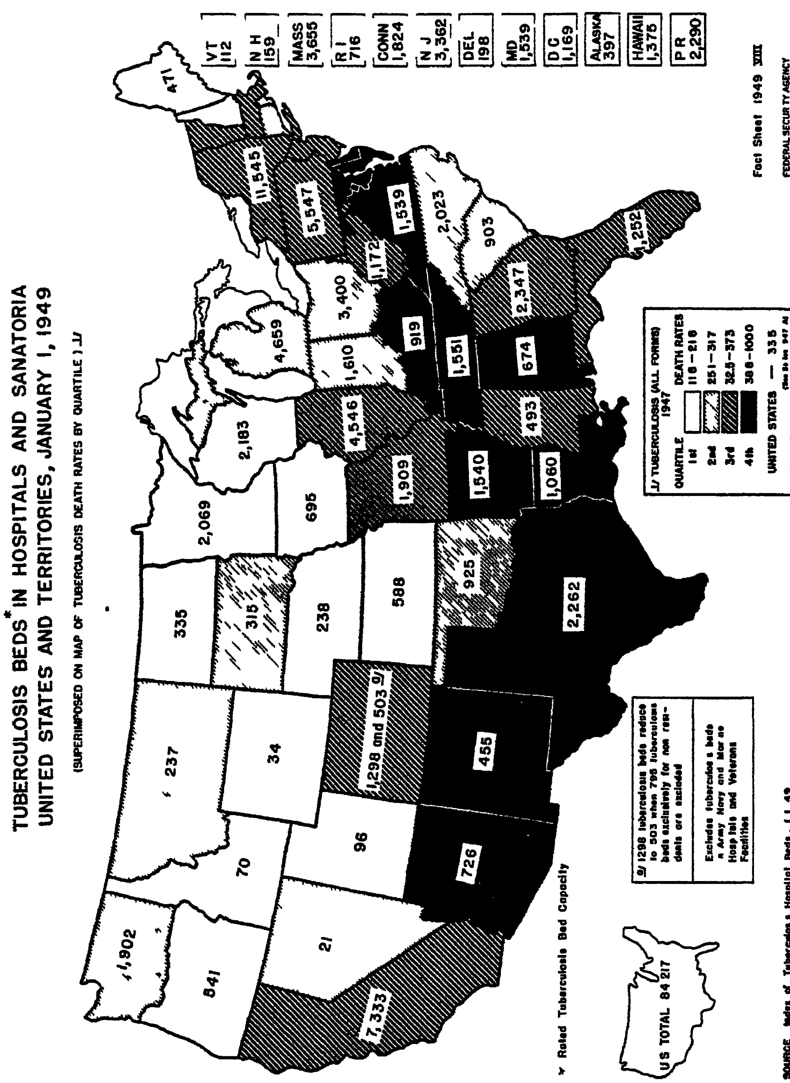

TUBERCULOSIS BEDS* IN HOSPITALS AND SANATORIA
UNITED STATES AND TERRITORIES, JANUARY 1, 1949
(SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE) 1/
VT 112
N H 159
MASS 3,655
R I 716
CONN 1,824
N J 3,362
DEL 198
MD 1,539
D C 1,169
ALASKA 397
HAWAII 1,375
P R 2,290
1/ TUBERCULOSIS (ALL FORMS) 1947
QUARTILE
DEATH RATES
1st 11.6-21.8
2nd 25.1-31.7
3rd 32.5-37.3
4th 38.6-100.0
UNITED STATES — 33.5
US TOTAL 84,217
* Rated Tuberculosis Bed Capacity
Excludes tuberculosis beds in Army, Navy and Marine Hospitals and Veterans Facilities
Fact Sheet 1949 XIII
FEDERAL SECURITY AGENCY

Figure 2.

occupied; 9,369—11.3 percent of the available beds—were vacant. Many of these vacancies are probably caused by such factors as rules concerning the admission of patients, residence laws, the means test, administration of the means test which may be a lengthy procedure, or temporary lack of patients. A few are caused by the cleaning and administrative routines necessary between patients.

The figures on occupancy given in this table correspond closely with the 1948 figures published in the Hospital Number (*11*) of The Journal of the American Medical Association, although the former are based on census for a given day and the latter on average daily census. The Journal showed that in 1948, 85.5 percent of the beds in all hospitals and 81.1 percent of the tuberculosis beds were occupied.

The distribution of tuberculosis beds by States is shown in figure 2.

Table 2 gives an analysis by States of the rated capacity, beds available, and beds occupied in the 605 reporting hospitals. It also gives the ratios (as percentages) for each State of (1) beds occupied to rated capacity; (2) beds occupied to beds available; and (3) beds available to rated capacity.

For example, to illustrate the meaning of the ratios—in Georgia 61.4 percent of rated tuberculosis beds were occupied on January 1, 1949. This appears to be a low ratio, but the table shows that only 68.9 percent of the rated tuberculosis bed capacity was actually available, and of the available beds 89 percent were occupied. In Georgia, although a relatively low percentage of the rated tuberculosis bed capacity is available (the average for the United States is 94 percent), the use of the available beds is about average.

The percentage of the rated tuberculosis bed capacity which is actually available varies from Georgia's 68.9 to 100 for Idaho, Mississippi, Montana, Nevada, Utah, Vermont, and Wyoming, and 100.7 for New York State.

The data on relationship of occupancy to rated capacity ranges from a low of 61 and 63 percent respectively for Georgia and Tennessee to 100 percent for Idaho and Wyoming. In 24 States and Territories the percentage falls between 85 and 100.

The occupancy of available beds, on the other hand, ranges from 76.7 in Pennsylvania to 100 percent in Idaho, New Hampshire, and Wyoming.

States in which a very high percentage of the available beds are occupied—90 percent or more—probably need more beds. Those in which a low percentage of the available beds are occupied are obviously not making full use of the beds which exist. Some of the reasons may be inefficient administration, lack of funds, or personnel deficiencies.

Table 3 summarizes the material in table 2 by showing the number of States which fall in the various percentage groups for each of the

Table 2. *Tuberculosis beds: Number of hospitals and factors related to the usage of tuberculosis beds in hospitals, by States and Territories, Jan. 1, 1949*

Area	Number of hospitals	Rated bed capacity	Beds available	Beds occupied	Beds occupied as a percent of rated capacity	Beds occupied as a percent of beds available	Beds available as a percent of rated capacity
	(1)	(2)	(3)	(4)	(4)÷(2)	(4)÷(3)	(3)÷(2)
U. S. and Territories	[a] 605	88,279	[b] 82,767	[c] 73,398	83.1	88.7	93.8
Continental U. S.	[a] 582	84,217	[d] 79,011	[e] 69,985	83.1	88.6	93.8
Territories	23	4,062	[f] 3,756	[g] 3,413	84.0	90.9	92.5
Alabama	8	674	658	617	91.5	93.8	97.6
Arizona	16	726	722	657	90.5	91.0	99.4
Arkansas	3	1,540	1,367	1,358	88.2	99.3	88.8
California	[h] 71	7,333	7,030	6,473	88.3	92.1	95.9
Colorado	17	1,298	1,263	1,005	77.4	79.6	97.3
Connecticut	9	1,824	1,546	1,422	78.0	92.0	84.8
Delaware	2	198	181	156	78.8	86.2	91.4
District of Columbia	4	1,169	1,069	1,031	88.2	96.4	91.4
Florida	7	1,252	1,222	1,081	86.3	88.5	97.6
Georgia	4	2,347	1,618	1,440	61.4	89.0	68.9
Idaho	1	70	70	70	100.0	100.0	100.0
Illinois	[i] 35	4,546	4,123	3,612	79.5	87.6	90.7
Indiana	11	1,610	1,477	1,398	86.8	94.7	91.7
Iowa	6	695	614	598	86.0	97.4	88.3
Kansas	4	588	502	455	77.4	90.6	85.4
Kentucky	6	919	739	701	76.3	94.9	80.4
Louisiana	7	1,060	945	750	70.8	79.4	89.2
Maine	5	471	439	373	79.2	85.0	93.2
Maryland	7	1,539	1,465	1,356	88.1	92.6	95.2
Massachusetts	[i] 26	3,655	3,089	2,602	71.2	84.2	84.5
Michigan	26	4,659	4,469	4,203	90.2	94.0	95.9
Minnesota	17	2,069	1,980	1,652	79.8	83.4	95.7
Mississippi	3	493	493	415	84.2	84.2	100.0
Missouri	9	1,909	1,736	1,599	83.8	92.1	90.9
Montana	[i] 4	237	237	226	95.4	95.4	100.0
Nebraska	2	238	214	198	83.2	92.5	89.9
Nevada	1	21	21	20	95.2	95.2	100.0
New Hampshire	2	159	123	123	77.4	100.0	77.4
New Jersey	20	3,362	3,241	2,737	81.4	84.4	96.4
New Mexico	6	455	444	386	84.8	86.9	97.6
New York	62	11,545	11,631	10,370	89.8	89.2	100.7
North Carolina	23	2,023	1,949	1,756	86.8	90.1	96.3
North Dakota	1	335	310	255	76.1	82.3	92.5
Ohio	[i] 25	3,400	3,280	3,065	90.1	93.4	96.5
Oklahoma	6	925	885	748	80.9	84.5	95.7
Oregon	5	541	480	459	84.8	95.6	88.7
Pennsylvania	[i] 27	5,547	5,364	4,116	74.2	76.7	96.7
Rhode Island	3	716	543	509	71.1	93.7	75.8
South Carolina	6	903	839	702	77.7	83.7	92.9
South Dakota	2	315	310	240	76.2	77.4	98.4
Tennessee	10	1,551	1,243	979	63.1	78.8	80.1
Texas	22	2,262	[d] 2,239	[e] 1,942	85.9	86.7	99.0
Utah	1	96	96	80	83.3	83.3	100.0
Vermont	2	112	112	103	92.0	92.0	100.0
Virginia	9	1,539	1,489	1,293	84.0	86.8	96.8
Washington	12	1,902	1,866	1,743	91.6	93.4	98.1
West Virginia	5	1,172	1,132	1,014	86.5	89.6	96.6
Wisconsin	21	2,183	2,112	1,863	85.3	88.2	96.7
Wyoming	1	34	34	34	100.0	100.0	100.0
Alaska	9	397	[j] 389	[k] 388	97.7	99.7	98.0
Hawaii	4	1,375	1,225	996	72.4	81.3	89.1
Puerto Rico	10	2,290	[l] 2,142	[m] 2,029	88.6	94.7	93.5
Medians:							
Continental U. S.					84.2	90.1	95.9
U. S. and Territories					84.5	90.4	95.8

[a] Includes 7 hospitals for which the rated tuberculosis bed capacity was not stated and 2 hospitals (of 15 and 116 beds rated tuberculosis capacity) which were closed for alterations.
[b] Includes 708 beds, the estimated number of beds available in 6 hospitals which did not report the number of beds not available for use.
[c] Includes 629 beds the estimated number of beds occupied in 6 hospitals which did not report the number of beds occupied.
[d] Includes 10 beds (90 percent of rated tuberculosis bed capacity) for 1 hospital which did not report the number of beds not available for use.
[e] Includes 9 beds (80 percent of rated tuberculosis bed capacity) for 1 hospital which did not report the number of beds occupied.
[f] Includes 698 beds, the estimated number of beds available in 5 hospitals which did not report the number of beds not available for use.

three ratios described above. It is interesting to see that with respect to the ratio of beds occupied to rated tuberculosis bed capacity, most of the States and Territories fall between 75 and 90 percent. But for the ratio of beds available to rated capacity more than half the States were above 95 percent. And for the ratio of beds occupied to beds available more than half the States were above 90 percent.

Table 3. *Frequency distribution of States by three ratios of factors related to the usage of tuberculosis beds in hospitals, United States and Territories, Jan. 1, 1949*

Percent range	Number of States and Territories		
	Beds occupied as a percent of rated capacity	Beds occupied as a percent of beds available	Beds available as a percent of rated capacity
Total U. S. and Territories	52	52	52
Over 95.0 percent	[a] 5	[a] 10	[a] 29
90 0–94 9 percent	6	[a] 17	[a] 9
85.0–89.9 percent	[a] 13	11	[a] 7
80.0–84.9 percent	9	[a] 9	4
75.0–79 9 percent	12	5	2
70 0–74.9 percent	[a] 5		
65 0–69.9 percent			1
60.0–64.9 percent	2		

[a] Includes one Territory.

Table 4 shows the number of hospitals and the number of beds in each State and Territory by rated tuberculosis bed capacity. Six hospitals in the United States and Territories have rated tuberculosis bed capacities of more than 1,000, the largest having 2,200 beds.

The largest group of hospitals has tuberculosis units with a rated tuberculosis bed capacity of less than 50. The 191 hospitals in this size group were 31.6 percent of all the hospitals. The hospitals with a rated tuberculosis bed capacity of 100–249 account for the largest number of tuberculosis beds—there are almost 25,000 beds in hospitals of this size—28.1 percent of the total rated bed capacity. Figure 3 graphically summarizes this material.

Table 5 presents data for the rated bed capacity, beds available and beds occupied, by size, for the 605 hospitals in the United States and Territories and shows the percent distribution of each factor. Twenty-eight and one-tenth percent of the rated tuberculosis bed

[g] Includes 620 beds, the estimated number of beds available in 5 hospitals which did not report the numbe of beds occupied.
[h] Includes 2 hospitals for which the rated tuberculosis bed capacity was not stated and 2 hospitals (of 15 and 116 beds rated tuberculosis capacity) which were closed for alterations.
[i] Includes 1 hospital for which the rated tuberculosis bed capacity was not stated.
[j] Includes 9 beds (90 percent of rated tuberculosis bed capacity) for 1 hospital which did not report the number of beds not available for use.
[k] Includes 8 beds (80 percent of rated capacity) for 1 hospital which did not report the number of beds occupied.
[l] Includes 689 beds (90 percent of rated tuberculosis bed capacity) for 4 hospitals which did not report the number of beds not available for use.
[m] Includes 612 beds (80 percent of rated capacity) for 4 hospitals which did not report the number of beds occupied.

Table 4. *Number of hospitals with tuberculosis beds by rated tuberculosis bed capacity, for each State and Territory, Jan. 1, 1949*

States and Territories	Rated tuberculosis bed capacity: Total		1-49 beds		50-99 beds		100-249 beds		250-499 beds		500-749 beds		750-999 beds		1,000 beds and over		Not stated
	Number of hospitals	Number of beds	Number of hospitals	Number of beds	Number of hospitals	Number of beds	Number of hospitals	Number of beds	Number of hospitals	Number of beds	Number of hospitals	Number of beds	Number of hospitals	Number of beds	Number of hospitals	Number of beds	Number of hospitals
U. S. and Territories	605	88,279	191	5,151	148	10,214	164	24,801	61	20,922	20	11,571	8	6,866	6	8,754	7
Continental U. S.	582	84,217	183	5,021	146	10,049	155	23,472	59	20,222	20	11,571	6	5,128	6	8,754	7
Territories	23	4,062	8	130	2	165	9	1,329	2	700	0	0	2	1,738	0	0	-
Alabama	8	674	3	63	2	135	3	476	0	0	0	0	0	0	0	0	-
Arizona	16	726	10	242	5	384	1	100	0	0	0	0	0	0	0	0	-
Arkansas	3	1,540	1	18	0	0	0	0	1	367	0	0	0	0	1	1,155	-
California	71	7,333	31	745	12	876	19	2,523	5	1,515	1	550	0	0	1	1,091	2
Colorado	17	1,298	8	249	5	320	3	470	1	250	0	0	0	0	0	0	-
Connecticut	9	1,824	2	54	1	72	2	285	4	1,413	0	0	0	0	0	0	-
Delaware	2	198	0	0	1	68	1	130	0	0	0	0	0	0	0	0	-
District of Columbia	4	1,169	0	0	0	0	3	501	0	0	1	668	0	0	0	0	-
Florida	7	1,252	3	112	1	55	1	205	1	380	1	500	0	0	0	0	-
Georgia	4	2,347	1	47	2	100	0	0	0	0	0	0	0	0	1	2,200	-
Idaho	1	70	0	0	1	70	0	0	0	0	0	0	0	0	0	0	-
Illinois	35	4,546	7	217	17	1,184	7	927	1	340	1	557	0	0	1	1,321	1
Indiana	11	1,610	2	74	1	60	7	1,222	1	251	0	0	0	0	0	0	-
Iowa	6	695	2	45	3	225	0	0	1	425	0	0	0	0	0	0	-
Kansas	4	588	3	87	0	0	0	0	0	0	1	501	0	0	0	0	-
Kentucky	6	919	3	54	0	0	1	115	1	250	1	500	0	0	0	0	-
Louisiana	7	1,060	2	81	2	153	2	337	1	489	0	0	0	0	0	0	-
Maine	5	471	2	42	0	0	3	429	0	0	0	0	0	0	0	0	-
Maryland	7	1,539	0	0	2	119	2	389	3	1,031	0	0	0	0	0	0	-
Massachusetts	26	3,655	6	152	5	330	10	1,500	3	1,100	1	573	0	0	0	0	1
Michigan	26	4,659	2	80	11	804	9	1,342	2	702	0	0	2	1,731	0	0	-
Minnesota	17	2,069	8	253	4	223	2	288	2	655	1	650	0	0	0	0	-
Mississippi	3	493	2	68	0	0	0	0	1	425	0	0	0	0	0	0	-
Missouri	9	1,909	3	80	1	52	3	477	0	0	2	1,300	0	0	0	0	-
Montana	4	237	2	12	0	0	1	225	0	0	0	0	0	0	0	0	1

Nebraska	2	238	1	32	0	0	1	206	0	0	0	0	0	0	0	0	--------
Nevada	1	21	1	21	0	0	0	0	0	0	0	0	0	0	0	0	--------
New Hampshire	2	159	0	0	2	159	0	0	0	0	0	0	0	0	0	0	--------
New Jersey	20	3,362	5	141	2	133	9	1,406	3	1,101	1	581	0	0	0	0	--------
New Mexico	6	455	0	0	5	355	1	100	0	0	0	0	0	0	0	0	--------
New York	62	11,545	14	413	15	1,055	16	2,615	13	4,269	3	1,589	0	0	1	1,604	--------
North Carolina	23	2,023	15	386	2	114	4	623	1	300	1	600	0	0	0	0	--------
North Dakota	1	335	0	0	0	0	0	0	1	335	0	0	0	0	0	0	--------
Ohio	25	3,400	6	152	6	420	8	1,168	3	1,077	1	583	0	0	0	0	1
Oklahoma	6	925	1	30	0	0	4	595	1	300	0	0	0	0	0	0	--------
Oregon	5	541	2	81	1	80	2	380	0	0	0	0	0	0	0	0	--------
Pennsylvania	27	5,547	7	118	5	336	9	1,336	2	817	0	0	2	1,560	1	1,380	1
Rhode Island	3	716	1	38	1	65	0	0	0	0	1	613	0	0	0	0	--------
South Carolina	6	903	0	0	5	353	0	0	0	0	1	550	0	0	0	0	--------
South Dakota	2	315	0	0	0	0	2	315	0	0	0	0	0	0	0	0	--------
Tennessee	10	1,551	4	118	1	54	2	319	3	1,060	0	0	0	0	0	0	--------
Texas	22	2,262	11	278	5	320	5	709	0	0	0	0	1	955	0	0	--------
Utah	1	96	0	0	1	96	0	0	0	0	0	0	0	0	0	0	--------
Vermont	2	112	1	47	1	65	0	0	0	0	0	0	0	0	0	0	--------
Virginia	9	1,539	4	130	0	0	2	370	3	1,039	0	0	0	0	0	0	--------
Washington	12	1,902	1	45	4	232	6	743	0	0	0	0	1	882	0	0	--------
West Virginia	5	1,172	1	37	1	52	1	125	1	298	1	660	0	0	0	0	--------
Wisconsin	21	2,183	4	145	13	921	3	521	0	0	1	596	0	0	0	0	--------
Wyoming	1	34	1	34	0	0	0	0	0	0	0	0	0	0	0	0	--------
Alaska	9	397	7	105	0	0	2	292	0	0	0	0	0	0	0	0	--------
Hawaii	4	1,375	0	0	0	0	3	437	0	0	0	0	1	938	0	0	--------
Puerto Rico	10	2,290	1	25	2	165	4	600	2	700	0	0	1	800	0	0	--------

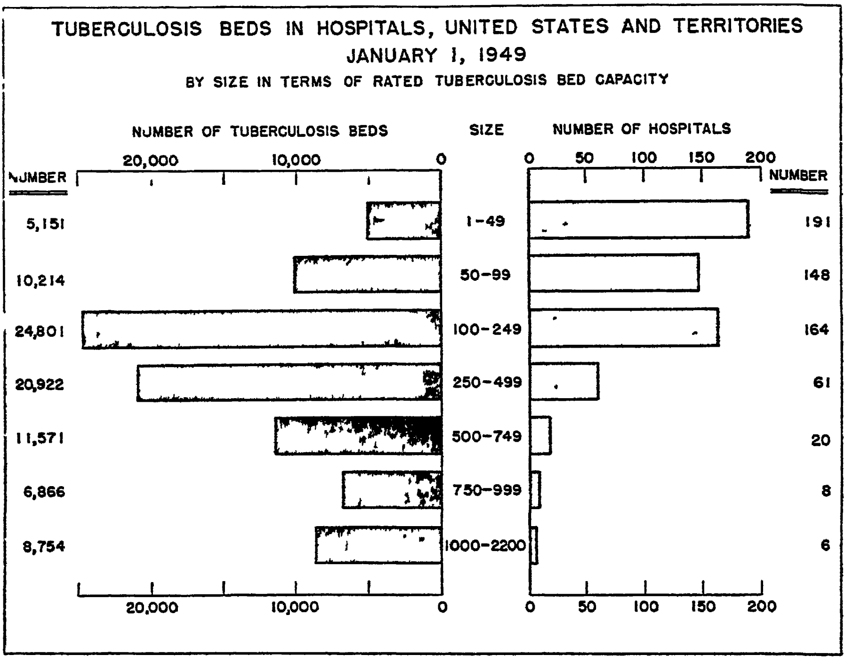


Figure 3.

capacity is found in hospitals of 100–249 tuberculosis beds; the same size hospitals account for 28.9 percent of the 73,398 occupied beds. Of the 82,767 available tuberculosis beds, 6.1 percent were in hospitals with less than 50 tuberculosis beds, whereas these same hospitals comprise 31.5 percent of all of the tuberculosis hospitals in the United States and Territories. It is also notable that while 6.1 percent of the tuberculosis beds available were in hospitals with less than 50 tuberculosis beds, only 5.8 percent of the rated tuberculosis bed

Table 5. *Percent distribution of hospitals and beds, by size, showing rated tuberculosis bed capacity, beds available and beds occupied, United States and Territories, Jan. 1, 1949*

Size of hospital (in terms of tuberculosis beds)	Hospitals		Rated bed capacity		Beds available		Beds occupied	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	605	100.0	88,279	100.0	82,767	100.0	73,398	100.0
1–49	191	31.6	5,151	5.8	5,019	6.1	4,109	5.6
50–99	148	24.5	10,214	11.6	9,769	11.8	8,435	11.5
100–249	164	27.1	24,801	28.1	23,501	28.4	21,182	28.9
250–499	61	10.1	20,922	23.7	19,121	23.1	17,314	23.6
500–749	20	3.3	11,571	13.1	10,809	13.0	9,866	13.4
750–999	8	1.3	6,866	7.8	6,508	7.9	5,560	7.6
1,000–2,200	6	1.0	8,754	9.9	8,042	9.7	6,932	9.4
Not stated	7	1.1						

capacity was in hospitals of this size showing that overcrowding is probably more frequent here than in hospitals of larger size.

Table 6 gives data for tuberculosis beds by size-intervals of 50 beds, a break-down into smaller segments than is used in tables 4 and 5. The rated tuberuculosis bed capacity, beds available, beds occupied and selected ratios for these factors are given. A low ratio of beds available to rated capacity indicates that a considerable number of beds are closed. If at the same time the ratio of beds occupied to beds available is low, the most obvious interpretation is that facilities are not being efficiently used.

Table 6. *Tuberculosis beds: Number of hospitals, rated capacity, beds available and beds occupied by size in terms of rated tuberculosis bed capacity, United States and Territories, Jan. 1, 1949*

Size of hospital (in terms of tuberculosis beds)	Number of hospitals	Rated bed capacity	Beds available	Beds occupied	Beds occupied as a percent of rated capacity	Beds occupied as a percent of beds available	Beds available as a percent of rated capacity
	(1)	(2)	(3)	(4)	(4)÷(2)	(4)÷(3)	(3)÷(2)
Total	[a] 605	88,279	[b] 82,767	[c] 73,398	83.1	88.7	93.8
1–49	[d] 191	5,151	[e] 5,019	[f] 4,109	79.8	81.9	97.4
50–99	148	10,214	[g] 9,769	[h] 8,435	82.6	86.3	95.6
100–149	[i] 94	11,153	10,565	9,317	83.5	88.2	94.7
150–199	34	5,729	5,605	5,151	89.9	91.9	97.8
200–249	36	7,919	[j] 7,331	[k] 6,714	84.8	91.6	92.6
250–299	14	3,731	3,501	3,145	84.3	89.8	93.8
300–349	16	5,016	4,646	4,292	85.6	92.4	92.6
350–399	18	6,596	5,908	5,387	81.7	91.2	89.6
400–449	11	4,608	[l] 4,135	[m] 3,751	81.4	90.7	89.7
450–499	2	971	931	739	76.1	79.4	95.9
500–549	5	2,533	2,347	2,154	85.0	91.8	92.7
550–599	8	4,547	4,415	3,849	84.6	87.2	97.1
600–649	2	1,213	1,040	1,021	84.2	98.2	85.7
650–699	5	3,278	3,007	2,842	86.7	94.5	91.7
700–749	------	------	------	------	------	------	------
750–799	2	1,560	1,498	986	63.2	65.8	96.0
800–849	2	1,633	1,485	1,455	89.1	98.0	90.9
850–899	2	1,780	1,780	1,674	94.0	94.0	100.0
900–949	1	938	788	602	64.2	76.4	84.0
950–999	1	955	955	843	88.3	88.3	100.0
1,000 and over	6	8,754	8,042	6,932	79.2	86.2	91.9
Not stated	7	------	------	------	------	------	------

[a] Includes 7 hospitals for which the rated tuberculosis bed capacity was not stated, 2 hospitals (of 15 and 116 beds rated tuberculosis capacity) which were closed for alterations.
[b] Includes 708 beds, the estimated number of beds available in 6 hospitals which did not report the number of beds available for use.
[c] Includes 629 beds, the estimated number of beds occupied in 6 hospitals which did not report the number of beds occupied.
[d] Includes one institution of 15 beds rated capacity which was closed for alterations.
[e] Includes 19 beds (90 percent of rated tuberculosis bed capacity) for 2 hospitals which did not report the number of beds not available for use.
[f] Includes 17 beds (80 percent of rated tuberculosis bed capacity) for 2 hospitals which did not report the number of beds occupied.
[g] Includes 149 beds (90 percent of rated tuberculosis bed capacity) for 2 hospitals which did not report the number of beds not available for use.
[h] Includes 132 beds (80 percent of rated tuberculosis bed capacity) for 2 hospitals which did not report the number of beds occupied.
[i] Includes 1 hospital of 116 beds rated tuberculosis capacity which was closed for redecoration.
[j] Includes 180 beds (90 percent of rated tuberculosis bed capacity) for 1 hospital which did not report the number of beds not available for use.
[k] Includes 160 beds (80 percent of rated tuberculosis bed capacity) for 1 hospital which did not report the number of beds occupied.
[l] Includes 360 beds (90 percent of rated tuberculosis bed capacity) for 1 hospital which did not report the number of beds not available for use.
[m] Includes 320 beds (80 percent of rated tuberculosis bed capacity) for 1 hospital which did not report the number of beds occupied.

Comparison of the Index for Different Years

Up to this point we have presented an analysis of the data obtained from the questionnaire for the Index, 4th edition. Table 7 makes a comparison between the 1st and 4th editions of the Index and shows

Table 7. *Comparisons of the Index for Jan. 1, 1946, with the Index for Jan. 1, 1949, showing changes in the number of hospitals listed and changes in the number of tuberculosis beds in the listed hospitals, United States and Territories*

States and Territories	Hospitals with same number beds, 1946 and 1949		Hospitals with more beds in 1949 than 1946		Hospitals with fewer beds in 1949 than 1946		Hospitals in 1946 Index, but not in 1949 Index		Hospitals in 1949 Index, but not in 1946 Index	
	Number hospitals	Number of beds	Number hospitals	Difference in beds	Number hospitals	Difference in beds	Number hospitals	Number beds in 1946	Number hospitals	Number beds in 1949
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Total	194	25,809	130	3,100	212	5,144	54	2,820	69	6,567
Alabama	2	135	4	95	2	2	----	----	----	----
Arizona	6	255	4	18	5	67	6	188	1	82
Arkansas	1	1 155	1	171	1	10	----	----	----	----
California	12	1,105	19	401	16	353	6	380	24	847
Colorado	5	288	4	39	8	146	3	109	----	----
Connecticut	3	587	1	4	4	61	1	16	1	72
Delaware	1	68	1	6	----	----	----	----	----	----
District of Columbia	2	376	----	----	1	8	----	----	1	125
Florida	3	143	----	----	2	40	7	257	2	705
Georgia	1	50	1	12	----	----	3	920	2	2,247
Idaho	----	----	----	----	----	----	2	47	1	70
Illinois	16	1,371	3	122	14	148	----	----	2	12
Indiana	4	567	----	----	7	113	1	50	----	----
Iowa	2	495	1	3	3	125	----	----	----	----
Kansas	----	----	1	2	2	17	1	30	1	42
Kentucky	----	----	3	152	2	76	----	----	1	8
Louisiana	2	149	3	20	1	11	----	----	1	98
Maine	2	42	----	----	3	51	----	----	----	----
Maryland	2	340	----	----	5	253	----	----	----	----
Massachusetts	11	1,911	6	84	7	140	----	----	2	20
Michigan	4	364	8	42	14	216	2	69	----	----
Minnesota	8	685	4	31	5	29	----	----	----	----
Mississippi	1	425	----	----	2	15	----	----	----	----
Missouri	3	895	1	7	5	88	----	----	----	----
Montana	----	----	----	----	3	134	----	----	1	6
Nebraska	----	----	2	18	----	----	----	----	----	----
Nevada	----	----	1	9	----	----	----	----	----	----
New Hampshire	----	----	----	----	2	81	----	----	----	----
New Jersey	7	591	5	68	7	366	----	----	1	20
New Mexico	5	378	----	----	1	4	1	15	----	----
New York	26	3,596	14	320	20	556	4	261	2	183
North Carolina	9	1,266	6	29	5	16	1	21	3	80
North Dakota	----	----	----	----	1	15	----	----	----	----
Ohio	8	492	6	287	11	328	----	----	----	----
Oklahoma	1	100	----	----	4	102	2	29	1	120
Oregon	1	80	1	5	3	43	----	----	----	----
Pennsylvania	6	1,258	7	131	8	550	5	112	6	166
Rhode Island	----	----	1	25	2	32	----	----	----	----
South Carolina	1	550	1	9	4	62	----	----	----	----
South Dakota	1	192	----	----	1	7	----	----	----	----
Tennessee	5	569	----	----	3	113	2	20	2	416
Texas	5	1,255	8	53	5	60	1	5	4	69
Utah	1	96	----	----	----	----	----	----	----	----
Vermont	1	47	----	----	1	19	----	----	----	----
Virginia	5	1,203	1	7	2	21	----	----	1	30
Washington	2	170	6	465	3	103	----	----	1	58
West Virginia	2	177	----	----	3	183	----	----	----	----
Wisconsin	9	847	2	5	9	143	1	40	1	24
Wyoming	1	34	----	----	----	----	----	----	----	----
Alaska	2	30	2	8	2	11	4	191	3	302
Hawaii	1	212	1	451	2	114	1	60	----	----
Puerto Rico	4	1,200	1	1	1	12	----	----	4	765

the distribution of these changes by States. The first two columns show that 194 hospitals with 25,809 beds have the same rated tuberculosis capacity in 1949 as they had in 1946. This involves approximately one-third of the hospitals and somewhat less than one-third of the rated tuberculosis bed capacity shown in the most recent Index. One hundred and thirty hospitals increased their rated bed capacity by 3,100 beds, or an average of about 40 beds per hospital in the period between the first and fourth report. Two hundred and twelve hospitals had fewer beds in 1949 than in 1946; these hospitals were responsible for a decrease of 5,144 beds. Fifty-four hospitals which were listed in 1946 with a total of 2,820 beds do not appear in the 1949 Index. This decrease is more than offset by the 69 hospitals with 6,567 beds, which were not listed in the 1946 Index, but which appear in the 1949 Index.

Some of the changes in columns 3 through 6 may be due to what might be termed "random variations in reporting," but undoubtedly most of them are real changes in the rated tuberculosis bed capacities of institutions. While it is not possible to determine accurately which of the variations in columns 7 through 10 are the result of more efficiency in locating the hospitals and better discrimination in discontinuing the listings of nontuberculosis hospitals, it is safe to assume that the majority of the changes noted are real changes.

The Construction Program

The subject of how many beds for tuberculosis are actually new to the tuberculosis hospital program in the United States and Territories revolves around a topic which is basically important—replacements for obsolete beds. If all the existing beds were adequate, any construction program would result in an increase in the number of tuberculosis beds. Unfortunately, some construction is undertaken to replace inadequate or obsolete beds. This gives rise to two further complementary questions. How many of the existing tuberculosis beds are inadequate and how much of the construction proposed or in process of construction is aimed at replacing inadequate beds rather than at adding to the total?

Although the Division of Tuberculosis does not obtain information about the adequacy of the beds reported for the Index, there is available one source of information concerning adequacy. The Division of Hospital Facilities receives from the State agencies administering the hospital program a State Plan which includes inventories of hospital facilities of the State. The number of tuberculosis beds needed is part of the State Plan and is based on minimum standards prescribed by the Hospital Survey and Construction Act. The States determine

whether the beds that they have are acceptable or unacceptable on the basis of their own criteria. A summary of the State Plans indicated that there were 12,906 unacceptable beds in the United States and Territories included in the total of 85,466 tuberculosis beds, as reported for December 31, 1948 (*12*). Another report from the Division of Hospital Facilities shows that by May 31, 1949, 28 *approved* project applications for 2,809 tuberculosis beds in 16 States and Territories had been received; these provided for new facilities, additions, alterations or replacements to existing facilities. The total cost involved was estimated at $27,388,267 (*13*).

It should be noted that construction is sometimes undertaken without Federal assistance. In such instances, except for additions to hospitals already listed in the Index, there is no formal means of receiving notification about the new facilities. We must depend upon news releases and voluntary communications sent to this Division.

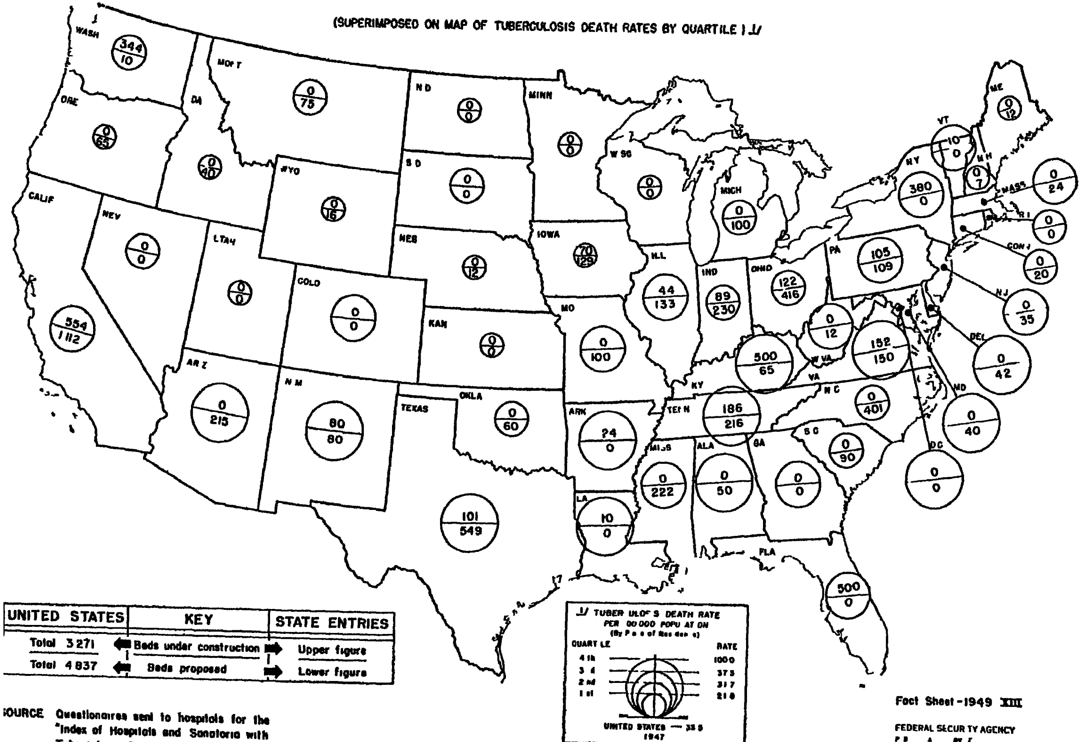
Although the main function of the post card questionnaire is to collect information on capacity and occupancy, two questions on construction were asked. Replies to question 4 and 5 on the card sent to each hospital by the Division of Tuberculosis indicated that there were 3,271 tuberculosis beds under construction and that hospitals and sanatoria in continental United States proposed to construct 4,837 additional tuberculosis beds as of January 1, 1949. Figure 4 shows the distribution by States of these statistics. It is important to remember that the data were collected from existing hospitals. Therefore completely new hospitals are not included in these figures.

An analysis of the data shown in figure 5 for the Index as of January 1, 1948 indicated that the 1,674 tuberculosis beds under construction and the 8,766 tuberculosis beds proposed were not reflected as increases in rated bed capacity in the current Index for Janaury 1, 1949. This conclusion was obtained from an analysis of January 1, 1948 and January 1, 1949 data for only the hospitals which reported a construction program on January 1, 1948. The analysis indicated that in the aggregate no substantial increase in rated tuberculosis bed capacity resulted from the new construction reported to us the previous year. The reported data amounted to an excess of only 152 over the losses experienced from decreased rated tuberculosis bed capacities for the matched hospitals. Some institutions may be replacing obsolete beds with their current and proposed building construction programs.

In reviewing this phase of the construction program, it must be concluded that there are still an insufficient number of local beds for tuberculosis patients. Construction programs have succeeded only in "holding the line." They have not afforded a material increase in the number of tuberculosis beds.

TUBERCULOSIS BEDS UNDER CONSTRUCTION AND PROPOSED CONSTRUCTION, UNITED STATES, JANUARY 1, 1949

(SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE) 1/



UNITED STATES	KEY	STATE ENTRIES
Total 3,271	Beds under construction	Upper figure
Total 4,837	Beds proposed	Lower figure

SOURCE: Questionnaires sent to hospitals for the "Index of Hospitals and Sanatoria with Tuberculosis Beds, January 1, 1949"

Figure 4.

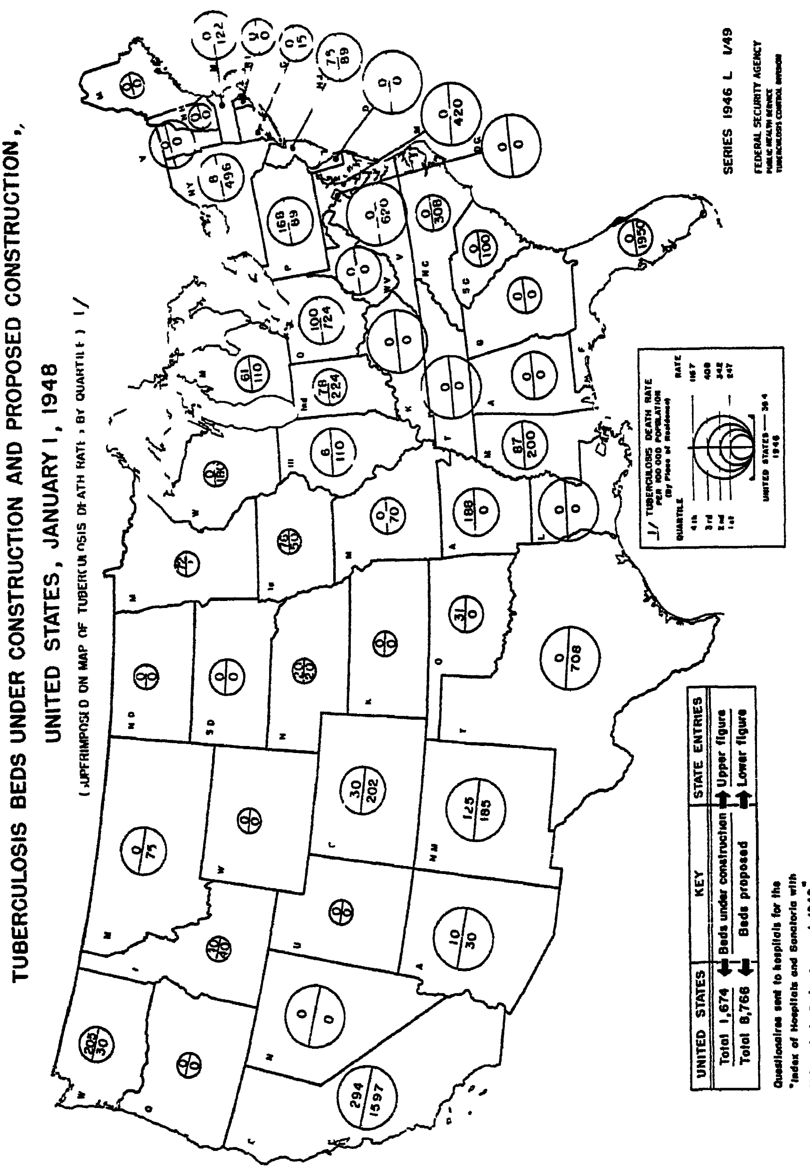

TUBERCULOSIS BEDS UNDER CONSTRUCTION AND PROPOSED CONSTRUCTION,
UNITED STATES, JANUARY 1, 1948
(SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATE, BY QUARTILE) 1/
UNITED STATES
KEY
STATE ENTRIES
Total 1,674 Beds under construction Upper figure
Total 6,766 Beds proposed Lower figure
Questionnaires sent to hospitals for the "Index of Hospitals and Sanatoria with Tuberculosis Beds, January 1, 1948"
1/ TUBERCULOSIS DEATH RATE PER 100,000 POPULATION
QUARTILE
RATE
SERIES 1946 L 1/49
FEDERAL SECURITY AGENCY
PUBLIC HEALTH SERVICE
TUBERCULOSIS CONTROL DIVISION

Figure 5.

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World Health Organization Tuberculosis Program for 1950

The Problem and Its Significance

The world-wide nature of the tuberculosis problem requires no emphasis. The Interim Commission placed tuberculosis with malaria, venereal diseases, and maternal and child health for priority of practical endeavor. During the period of the Interim Commission, data was collected from many countries concerning the incidence of infection, morbidity, and mortality from tuberculosis, and it was found that in just over 30 countries it was possible to be reasonably confident in the official statistics when appraising the severity of the problem. * * *

It has not been possible to classify countries into those with assumed low, medium, or high prevalence rates. Nevertheless, there is evidence on morbidity and infection from many areas and these admittedly slender guides have been of some value in estimating what the toll of the disease may be in countries in which official mortality rates

Reprinted from the Official Records of the World Health Organization, No. 18.

are not available, or are unreliable. Several authors have in the past made attempts to evaluate the tuberculosis deaths in the world. Ferrara, for example, calculated that among the inhabitants of the globe, numbering nearly 2,000 million, the annual deaths from tuberculosis amounted to over 1,600,000. Douill has stated that, for a large part of the world's population, tuberculosis deaths are unrecognized, uncounted, or both. "It is impossible," he says, "to make more than the roughest estimate of the toll which the disease exacts. It is safe to say, however, that each year in the world, more than 3 million deaths from all forms of tuberculosis occur, and that the total probably exceeds 5 millions."

Drolet has estimated that in the United States alone since 1900 almost 5 million people have succumbed prematurely to the tubercle bacillus. For 20 countries for which he had reliable statistics during the 40-year period from 1881 to 1921, it was medically certified that altogether 18½ million people died from pulmonary tuberculosis. Drolet estimated further that, even with the present comparatively low rates in many countries, tuberculosis causes more than 2 million deaths a year throughout the world.

It is not only the absence of data, but also the unreliability of much of the existing data, that makes estimates of the death rates of many countries purely speculative. In many areas in Africa and Asia there is little information of any kind to be obtained. A number of countries add almost nothing to our knowledge. But even in certain European, and in a number of Latin American and Asiatic countries, deaths from unspecified causes, defects in death certification, and the absence of a population census make such figures as may be forthcoming of meager value. There is little to be gained by publishing official death rates for countries in which as many as 50 percent of the deaths are not medically certified, where as many as 15 to 20 percent are registered as being due to unknown causes, and which may show only 1 to 2 percent of all deaths as being due to tuberculosis, when it is common knowledge that the results of tuberculin testing in these or similar population groups show a moderately high degree of infectivity under environmental conditions which leave much to be desired, and where poverty, with all its prejudicial consequences, is present to an extreme degree. In more than one country in the world, in recent years, carefully planned studies into infection and morbidity rates have shown clearly that the incidence of clinically significant tuberculosis is far in excess of that which is compatible with the death rates as returned officially by the same communities.

Mortality rates alone can lead to highly erroneous conclusions. The time may not yet have arrived when it is possible to correlate death rates with tuberculin reactions, or with the results of mass

radiological surveys in representative age, sex, and social groups of the population, and to use those clinical procedures as a guidance to more approximate death rates. It is submitted, however, that when, in addition to such surveys, an analysis is also made of the economic life, habits, nutritional standards, and other environmental factors, and when the racial composition of any community is studied in the light of the known behavior of the more susceptible races under modern and social conditions, then there may be ample guides to vindicate the acceptance of an authoritative medical opinion of the tuberculosis morbidity and mortality rates in these communities. It required the introduction of mass radiology in England to prove that the opinion of many experienced tuberculosis physicians on tuberculosis morbidity was right and that the previous dispensary records of notifications were wrong.

It will still be necessary for teams of experts to undertake epidemiological surveys and demonstrations in certain areas, not merely with the object of reducing morbidity, but in order that mortality rates may be more precisely ascertained. Mortality rates which are obviously erroneous are not merely a source of confusion in attempting international comparisons, but they may even tend to retard the progress of antituberculosis in countries in which they originate, since they produce a false impression as to the severity of the problem and mislead administrators who tend to base both administrative and financial plans for future action on the information which they may receive from their own statistical authority.

The data concerning mortality, morbidity and infection from most countries in the world has been considered. In addition, the observations of many reliable administrative and clinical workers in undeveloped countries have also been considered. It is, however, impossible within the scope of this note to produce all the evidence on which the general findings have been made. * * *.

Work Previously Accomplished

Prior to the Second World War there was no attempt made to deal with tuberculosis from the international standpoint, except in a few very limited instances. The League of Nations, between two wars, published a number of documents on the subject.

There was, however, no practical field work in the program of the League. The only other international body in the tuberculosis field was the International Union against Tuberculosis with its headquarters in Paris, but this body was largely academic in function and confined its activities almost entirely to the holding of conferences, and the publication of a quarterly bulletin.

Shortly after the Second World War began, it was appreciated that

the devastation brought about as a result of the conflict necessitated the setting-up of some kind of temporary organization to cope with the emergency, and in 1943 the United Nations Relief and Rehabilitation Administration came into being, with tuberculosis as an important priority in its plan for action. There is no doubt that the scope of UNRRA's interests in tuberculosis was broader than that of any previous international organization; its aim was indeed "to equalize opportunities for the restoration of health in the various countries."

However, UNRRA's assistance was originally intended for countries which had been invaded and seriously damaged, and which lacked foreign exchange to purchase necessary supplies. Such countries were Albania, Byelorussia, China, Czechoslovakia, Ethiopia, Greece, Poland, Ukraine and Yugoslavia. Later, Italy, Austria, and a few other countries were added to the list.

In tuberculosis, UNRRA made valuable contribution, especially in Poland, Czechoslovakia, China, and Greece, into which countries considerable consignments of supplies (X-ray and hospital equipment and surgical instruments) were sent. In Greece, in particular, a complete team of specialists worked for over 2 years and succeeded in restoring the prewar tuberculosis services, and indeed, in adding to them, despite difficulties of transport, civil war, and political disturbances.

Toward the end of 1946, however, UNRRA's programs virtually ceased, and its duties in most fields were handed over to the Interim Commission of WHO, together with a sum of 1½ million dollars to complete certain of the health and medical relief work which had been initiated by UNRRA. The training which the UNRRA officers obtained even in a limited geographical area has been of the greatest value in the much wider field which has now to be covered.

The steps which WHO has taken to fulfill its functions as adviser in tuberculosis to the world are given in the Director-General's report for 1948.

Since the spring of 1948, WHO has been in close contact with the United Nation's International Children's Emergency Fund, particularly with regard to the mass tuberculin testing and BCG vaccination scheme, which was originally sponsored by the latter organization. The Secretariat has been represented at all the medical subcommittee meetings of UNICEF, and has advised on the technical level since the inception of the scheme. A WHO Tuberculin Testing and BCG Vaccination Panel has also been formed and met with representatives of UNICEF to discuss matters of detail in connection with techniques, etc. The culminating point in 1948 in the WHO-UNICEF cooperation was the formation of the Joint Health Policy

Committee, UNICEF-WHO, when it was agreed that all present and future medical projects sponsored by UNICEF should be approved by the Joint Committee.

Objectives

The immediate objective of WHO in tuberculosis has been to continue much of the work started by UNRRA in countries most in need, but from the brief survey of the epidemiology of tuberculosis given above, it will be seen that there are many countries in great need and which were not included in the UNRRA plan. It has therefore been thought advisable to invite all countries to submit to WHO their requests for 1949, in order that some idea may be forthcoming of the nature of the field services required, especially with regard to demonstrations in X-ray work, tuberculin testing, BCG vaccination, special forms of therapy, and in fellowships.

There will, no doubt, be need for such emergency or "immediate" services for a year or two, but acting on the advice of the Expert Committee on Tuberculosis, these emergency demonstration services should be planned in such a way that they will form the beginnings of a long-term program for each country requesting such services. For example, if demonstrations are requested for tuberculin testing and BCG vaccination, the object of WHO will be to begin this work and train the necessary local personnel so that, after a comparatively short time, the country itself will be in a position to carry on the work initiated by WHO, and to extend it.

In other words, WHO will point the way and will lead some of the less-developed States some steps on the journey, but the final goal must always be reached by the endeavor and continued efforts of nationals in their own lands, assisted, it may be, from time to time, by international agencies, but never substituted by them.

Few will dispute the need for guidance in tuberculosis from an authoritative governing body which can initiate a policy to be applied discriminately to the varying conditions which are to be found in many parts of the world. This body can gather and sift the results of observations extending through and beyond the lifetime of more than one generation. Such a body must, in the course of time, if it is to justify its existence, accomplish valuable work in the field in order to impress governments with the necessity of devoting adequate resources to the task before them.

It would appear that the transition from short-term to long-term policy in tuberculosis must be gradual, for it would be unreasonable to expect the underdeveloped areas to succeed where many of the more advanced countries have failed. The richness of our knowledge about tuberculosis today is such, however, that many of the errors of the past can be rectified in the early stages of antituberculosis campaigns,

and it must be the function of WHO to see that countries which have still to make much progress in this field are spared the bitter experiences of the pioneers, so that the long-term policies may be attained in a shorter period of time.

Work To Be Accomplished in 1950

Article 2 of the Constitution of WHO reads: "to assist Governments, upon request, in strengthening health services."

The first World Health Assembly approved that the program, as laid down in Official Records of WHO, No. 10, page 8, should in general be accepted.

It was decided to establish an Expert Committee on Tuberculosis and a Tuberculosis Section.

The Executive Board, at its first session, approved most of the recommendations of the report of the second session of the Expert Committee on Tuberculosis of the Interim Commission. The Executive Board at its second meeting accepted responsibility for the promotion of medical research in the BCG campaigns, and allocated $100,000 for this purpose.

It is planned to make as many contacts as possible with governments during 1949 in order that WHO will have a more precise idea of the possibilities for 1950 and onwards. It is not possible to ascertain these needs by correspondence alone with that degree of accuracy which is necessary for long-term planning.

Consequently, it will not be before the middle of 1950 that we shall be in a position to know what the reaction of many countries may be to the services which WHO is in a position to provide. But there are, even now, broad indications that a large number of countries are in grave need of equipment, personnel, and instruction in prevention, diagnosis, and treatment. Experience has shown that it is not absence of knowledge so much as absence of the necessary capital to put this knowledge into practical application which is at the root of many of the troubles in tuberculosis administration in large areas of the world. Evidence is available to the effect that leadership in tuberculosis is too often absent or defective; that no provision is made for the establishment of tuberculosis departments for the coordination of schemes, and that there is too great a tendency to concentrate on the erection of relatively expensive institutions and dispensaries without taking the necessary preliminary step of forming a central nuclear group of administrators and clinicians to insure that the campaign can be conducted according to some uniform plan of procedure.

Therefore, in 1950 there may be many demands for consultative services on the administrative side, and there will likewise be increasing need for material assistance in all branches of the antituberculosis

campaigns. It is indeed difficult to conceive of WHO's tackling this problem from the financial aspect without its being in possession of ways and means to supply countries with essentials to a much greater extent than is ever likely to be possible with the relatively limited budget resources now at its disposal.

The first World Health Assembly agreed to the setting-up of a joint committee of WHO and UNICEF representatives. It is possible that much of the UNICEF program may have to be maintained and supervised by WHO in 1950. This applies in particular to the work in connection with tuberculin testing and BCG vaccination as at present being conducted by UNICEF; no financial provision has been made to continue this work on the scale on which it is being conducted at present, although there is financial provision for supplying individual teams to demonstrate tuberculin testing and BCG techniques in individual countries. The streptomycin research project will have to be continued and provision is made in the 1950 budget for this to be done on a scale which aims at no more than the collection of scientific data under controlled conditions in countries which are prepared to follow out the plan laid down by the subcommittee on streptomycin of the WHO Expert Committee on Tuberculosis. The provision of laboratory facilities and fellowships also will be increasingly necessary in 1950 if the work is to proceed in many areas.

The method by which the work in 1950 will be conducted will be by the provision of consultative services and by sending demonstration teams into countries on their request.

In 1950 also, the headquarters staff will continue with the work of collecting data on recent advances and will continue to send to governments and other interested bodies such information as may enable them to improve their services and add to their knowledge.

Characteristics of Commercial X-Ray Screens and Films—IX

By Willard W. Van Allen*

This is the ninth in a series of reports on the characteristics of commercial X-ray film-screen-developer combinations. The following tables represent the accumulated and revised findings of the Electronics Laboratory to date. An earlier report in this journal[1] described the technical details of this investigation.

Table 1. *Speed of fluoroscopic screen-film-developer combinations* [1] [2]

Film and developer [3]	Screens								
	D sample 1	D sample 2	D sample 3	666D sample 1	666D sample 2	E-2	B sample 1	B sample 2	B-2
Ansco Fluorapid:									
Ansco Liquadol	105	125	140	75	100	------	------	------	------
Buck X-ray	115	125	140	75	100	------	------	------	------
Eastman Liquid	90	95	105	65	75	------	------	------	------
Eastman Rapid	135	145	165	85	110	------	------	------	------
Eastman X-ray	120	150	155	100	125	------	------	------	------
G. E. Supermix	155	170	200	100	130	------	------	------	------
DuPont Fluorofilm:									
Ansco Liquadol	90	110	120	65	85	------	------	------	------
Buck X-ray [4]	------	------	------	------	------	------	------	------	------
Eastman Liquid [4]	------	------	------	------	------	------	------	------	------
Eastman Rapid	100	110	125	65	85	------	------	------	------
Eastman X-ray	95	115	130	80	100	------	------	------	------
G. E. Supermix	130	145	165	90	110	------	------	------	------
Eastman Blue Photoflure:									
Ansco Liquadol	85	105	115	65	85	------	------	------	------
Buck X-ray	140	150	175	90	115	------	------	------	------
Eastman Liquid	160	165	195	100	130	------	------	------	------
Eastman Rapid	105	110	130	75	90	------	------	------	------
Eastman X-ray	95	115	130	75	100	------	------	------	------
G. E. Supermix	110	120	145	75	95	------	------	------	------
Eastman Green Photoflure:									
Ansco Liquadol	------	------	------	------	------	120	55	55	85
Buck X-ray	------	------	------	------	------	110	50	55	75
Eastman Liquid	------	------	------	------	------	135	60	65	90
Eastman Rapid	------	------	------	------	------	115	50	55	80
Eastman X-ray	------	------	------	------	------	140	60	70	95
G. E. Supermix	------	------	------	------	------	155	75	75	110

[1] Speeds are determined with film and screen in direct contact and therefore do not represent the over-all speed of the same combinations when used in a photofluorograph.
[2] Subsequent reports will contain data on additional developers used in combination with the screens and films shown in this table: these will include DuPont developers.
[3] Development time (as recommended by the manufacturer of the developer): Ansco Liquadol, 4 minutes; Buck X-ray, 8 minutes except Green Photoflure, 7 minutes; Eastman Liquid, 8 minutes except Green Photoflure, 7 minutes; Eastman Rapid, 8 minutes except Green Photoflure, 7 minutes; Eastman X-ray, 8 minutes; G. E. Supermix, 8 minutes. All development at 68° F.
[4] DuPont Fluorofilm reported currently unavailable.

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[1] Pub. Health Rep. 64: 581 (1949). For a complete discussion of the sensitometry of X-ray materials, see The Sensitometry of Roentgenographic Films and Screens by Morgan and Van Allen. Radiology 52: 832 (June 1949).

Table 2. *Speed of intensifying screen-film-developer combinations* [1]

Film and developer [2]	Screens								
	Buck			Eastman			Patterson		
	Xtra Speed	Mid-speed	Definition	Ultra speed	Fine grain	Definition	High speed	Par-speed	Detail
Ansco High Speed: [3]									
Ansco Liquadol	70	60	50	110	85	60	115	60	20
Buck X-ray	65	50	45	100	75	50	100	55	20
Eastman Liquid	50	45	40	85	60	45	85	45	15
Eastman Rapid	65	55	45	100	75	55	100	55	20
G. E. Supermix	75	60	50	110	85	60	115	65	20
DuPont No. 508:									
Ansco Liquadol	50	45	40	85	65	45	85	50	15
Buck X-ray	50	40	35	75	60	40	75	45	15
Eastman Liquid	40	35	30	65	45	35	60	35	15
Eastman Rapid	45	40	30	65	55	40	65	40	15
Eastman X-ray	55	50	40	90	70	50	80	55	20
G. E. Supermix	55	45	40	80	65	45	80	50	15
Eastman Blue Brand:									
Ansco Liquadol	90	75	65	145	110	75	130	80	25
Buck X-ray	85	70	60	140	105	70	130	80	25
Eastman Liquid	85	75	65	135	105	75	125	75	25
Eastman Rapid	75	65	55	120	90	65	105	60	25
Eastman X-ray	85	70	60	140	110	80	120	90	25
G. E. Supermix	90	75	65	145	105	75	135	80	25

[1] Subsequent reports will contain data on additional developers used in combination with the films and screens shown in this table; these will include DuPont developers.
[2] Development time (as recommended by the manufacturer of the developer): Ansco Liquadol, 3 minutes; Buck X-ray, 3 minutes; Eastman Liquid, 3 minutes; Eastman Rapid, 3 minutes; Eastman X-ray, 4½ minutes; G. E. Supermix, 3 minutes. All development at 68° F.
[3] Speeds with Eastman X-ray developer to be reported in a subsequent issue.

Table 3. *Average value of fog and contrast (gamma)* [1]

Film	Fog densities						Contrast (gamma)					
	Developer [2]						Developer [2]					
	Ansco-Liquadol	Buck X-ray	Eastman Liquid	Eastman Rapid	Eastman X-ray	G. E. Supermix	Ansco-Liquadol	Buck X-ray	Eastman Liquid	Eastman Rapid	Eastman X-ray	G. E. Supermix
Photofluorographic:												
Ansco Fluorapid	0.09	0.25	0.23	0.12	0.08	0.23	1.8	1.9	1.7	2.0	2.1	2.1
DuPont Fluorofilm [3]	.15	------	------	.20	.21	.40	2.0	------	------	1.9	1.9	2.1
Eastman Blue Photoflure	.04	.15	.07	.05	.07	.09	1.8	1.8	2.0	1.7	1.8	1.9
Eastman Green Photoflure	.11	.26	.15	.09	.10	.28	2.1	2.4	2.3	2.2	2.0	2.3
Roentgenographic:												
Ansco High Speed	.10	.07	.11	.04	------	.10	2.8	2.3	2.6	2.3	------	2.8
DuPont No. 508	.20	.07	.07	.04	.18	.04	2.7	2.2	2.1	2.2	2.6	2.6
Eastman Blue Brand	.08	.07	.08	.05	.06	.06	3.0	2.9	3.0	3.2	2.8	------

[1] Values obtained with open-tank development and continuous mechanical agitation at 68° F. Values for fog densities obtained in open tank without agitation have been found generally lower.
[2] Development times as given in tables 1 and 2. Similar data for other developers will appear in subsequent issues.
[3] DuPont Fluorofilm reported currently unavailable.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED AUGUST 13, 1949

A total of 3,157 cases of poliomyelitis was reported (an increase of 29 percent) as compared with 2,449 cases last week, a 5-year (1944–48) median of 1,016, and 1,409 for the corresponding week last year (an increase of 14 percent). Currently, increases were recorded in all of the 9 geographic divisions except the East South Central. Reports of the New England, Middle Atlantic, and North Central areas, reporting 2,335 cases (74 percent of the total and accounting for 85 percent of the increase) are as follows (last week's figures in parentheses): New England 274 (158), Middle Atlantic 681 (500), East North Central 868 (645), West North Central 512 (427). The 32 States reporting more than 18 cases each are as follows: *Increases*—Maine 56 (21), New Hampshire 24 (9), Massachusetts 139 (82), Connecticut 45 (32), New York 539 (390), New Jersey 101 (81), Pennsylvania 41 (29), Ohio 134 (99), Indiana 126 (96), Illinois 299 (250), Michigan 225 (147), Wisconsin 84 (53), Minnesota 142 (94), Missouri 123 (110), North Dakota 58 (48), Nebraska 36 (31), Kansas 56 (46), West Virginia 39 (26), Florida 25 (8), Mississippi 23 (22), Louisiana 29 (4), Oklahoma 92 (75), Idaho 44 (33), Colorado 50 (33), Washington 38 (24); *decreases*—Iowa 81 (84), Virginia 26 (27), Kentucky 33 (35), Tennessee 26 (36), Arkansas 60 (64), Texas 109 (121), California 106 (112). The total to date is 13,900, corresponding period last year, 8,430, 5-year median 5,008.

During the week 1 case of smallpox was reported in Idaho, 1 case of relapsing fever in California, and 3 cases of anthrax were reported in Pennsylvania. Massachusetts reported 69 cases of salmonella infection, and New York 2 cases.

Deaths recorded during the week in 94 large cities in the United States totaled 8,813, as compared with 8,854 last week, 7,934 and 8,896, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 7,934. The total for the year to date is 299,285, as compared with 299,865 for the corresponding period last year. Infant deaths during the week totaled 741, as compared with 737 last week, 619 for the same week last year, and a 3-year median of 686. The cumulative figure is 20,910, same period last year 21,507.

Telegraphic case reports from State health officers for week ended August 13, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis	Influenza	Measles	Meningitis meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever	Whooping cough	Rabies in animals
NEW ENGLAND STATES														
Maine	------	------	2	9	------	6	56	------	3	------	------	------	10	------
New Hampshire	------	------	------	------	1	------	24	------	------	------	------	------	2	------
Vermont	------	------	------	1	------	------	3	------	2	------	------	------	1	------
Massachusetts	5	------	------	52	1	------	130	------	20	------	------	------	113	------
Rhode Island	------	------	------	------	------	6	7	------	1	------	------	------	8	------
Connecticut	------	1	------	17	------	16	45	------	1	------	------	5	20	------
MIDDLE ATLANTIC STATES														
New York	4	3	(c)	134	3	125	530	------	d 21	------	------	4	242	5
New Jersey	2	1	2	61	------	20	101	1	5	------	------	------	74	1
Pennsylvania	3	------	(c)	73	2	------	41	------	8	------	------	9	152	------
EAST NORTH CENTRAL STATES														
Ohio	2	------	2	54	1	34	134	2	12	------	------	6	108	9
Indiana	6	1	------	6	------	1	126	------	9	------	------	------	16	------
Illinois	1	2	------	73	2	44	209	------	11	------	------	7	146	------
Michigan [a]	3	------	------	63	1	21	225	------	12	------	------	3	100	1
Wisconsin	------	------	6	82	1	------	84	------	9	------	------	------	105	1
WEST NORTH CENTRAL STATES														
Minnesota	1	------	------	9	3	13	142	------	4	------	------	------	2	------
Iowa	------	1	------	11	------	------	81	------	------	------	------	------	3	3
Missouri	3	------	------	------	2	6	123	------	4	------	8	4	8	------
North Dakota	------	14	------	3	3	------	58	------	2	------	------	------	8	------
South Dakota	------	------	------	1	3	------	16	------	1	------	------	------	------	------
Nebraska	------	------	------	1	------	------	36	------	11	------	------	------	1	------
Kansas	------	------	------	4	1	3	56	------	1	------	------	2	8	------
SOUTH ATLANTIC STATES														
Delaware	------	------	------	2	------	------	4	------	2	------	------	1	------	------
Maryland [a]	1	------	1	9	------	29	7	7	2	------	------	2	42	------
District of Columbia	2	------	------	9	1	20	8	------	1	------	------	------	2	------
Virginia	4	1	74	45	2	37	26	8	7	------	2	4	18	2
West Virginia	2	------	7	12	------	6	30	------	3	------	------	3	28	------
North Carolina	6	------	------	17	------	------	14	5	10	------	------	3	36	------
South Carolina	2	------	2	6	1	11	12	------	------	------	1	6	3	5
Georgia	8	------	6	6	------	15	11	3	3	------	------	4	------	8
Florida	1	------	------	29	------	9	25	------	3	------	------	2	2	------

Telegraphic case reports from State health officers for week ended August 13, 1949—Continued

Division and State	Diphtheria	Encephalitis	Influenza	Measles	Meningitis meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid[e] and paratyphoid fever	Whooping cough	Rabies in animals
EAST SOUTH CENTRAL STATES														
Kentucky	1			45	3		33	4				1	23	5
Tennessee	3	2	19	10	2	47	26				2	3	27	
Alabama	4			5	1	23	13		9			8	9	6
Mississippi[a]	9	1	1	2		15	23		2			2	3	
WEST SOUTH CENTRAL STATES														
Arkansas	1		17	1		10	60	1	3		4	4	28	1
Louisiana	1		2	2		24	29		4		1	5		2
Oklahoma		1	13	2	1	35	92	1	2			1		5
Texas	13	1	355	42	4	152	109	2	5		2	11	96	12
MOUNTAIN STATES														
Montana	1	2	3	12		2	5		3		2		1	
Idaho			9	21		2	44		[d] 8	1		2	6	
Wyoming						3	13	2			1		1	
Colorado	1		3	15	3	10	50		2			1	4	
New Mexico				14	1	11	11		1			2	3	
Arizona	1		10	1		7	18		6			2	11	
Utah[a]				23		4							17	
Nevada														
PACIFIC STATES														
Washington	1		2	31			38		10				21	
Oregon				16		11	6		2				36	
California	6	1	2	75	5	23	106		[d] 28			4	60	3
Total	98	32	538	1,106	48	804	3,157	36	253	1	23	111	1,604	
Median, 1944–48	195	18	580	1,139	67		1,016	29	555	2	17	140	2,483	
Year to date, 32 weeks	4,232	305	76,913	586,480	2,228	54,943	13,900	413	58,260	40	781	2,158	36,710	
Median, 1944–48	6,960	309	191,217	547,953	4,398		5,008	371	86,295	265	612	2,379	62,414	
Seasonal low week ends	(27th) July 9		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32nd) Aug. 14	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	464		1,046	638,873	3,143		12,978		80,958	50		1,698	46,743	
Median, 1943–48[b]	864		1,033	582,809	5,902		4,745		124,866	348		1,904	90,073	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for diphtheria, influenza, poliomyelitis, and typhoid fever the corresponding periods are 1944–45 to 1948–49.
[c] New York City and Philadelphia, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately, as follows: South Carolina 1, Tennessee 1, Alabama 2, Arkansas 2, California 1. Cases reported as Salmonella infection, not included in the table, were as follows: Massachusetts 69, New York 2.

Corrections—Cases reported—Poliomyelitis: Georgia, week ended July 23, 13 (instead of 14), July 30, 8 (instead of 9); North Carolina, week ended July 23, 16 (instead of 17).

Anthrax: Pennsylvania 3. *Relapsing fever:* California 1. Alaska: Influenza 1. Hawaii Territory: Measles 5, meningitis meningococcal 1.

PLAGUE INFECTION IN PARK COUNTY, COLO., AND THOMAS COUNTY, KANS.

Under date of August 12, 1949, plague infection was reported proved in a pool of 20 fleas from 6 ground squirrels, *Citellus richardsonii elegans*, trapped on July 29 at a location approximately 4.4 miles southwest of Fairplay, Park County, Colo., in a pool of tissue from 2 prairie dogs, *Cynomys ludovicianus*, found dead July 27 on a ranch 11 miles north of Levant, Thomas County, Kans., and in a pool of 119 fleas from the same 2 prairie dogs.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague infection in fleas.—Under date of August 4, 1949, plague infection was reported proved on July 15, 1949, in a mass inoculation of 15 fleas collected from rats trapped in District 1A, Kukuihaele, Island of Hawaii, T. H.

Panama Canal Zone

Notifiable diseases—June 1949.—During the month of June 1949, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chagas disease						1	1		1	1
Chickenpox	30		2		13		6		51	
Diphtheria	5		2				1	2	8	2
Dysentery:										
Amebic	1	1	1				3		5	1
Bacillary							1		1	
German measles					1				1	
Hepatitis, infectious					2				2	
Influenza					1				1	
Malaria [2]	4				20		28	3	52	3
Measles					7				7	
Meningitis, meningococcal			2					2	2	2
Mumps	1				1				2	
Pneumonia		6		2	16	1		3	[3] 16	12
Poliomyelitis	1								1	
Streptococcal throat			1						1	
Tetanus	1								1	
Tuberculosis		13		6	3			11	[3] 3	30
Typhus fever					1				1	
Whooping cough					1				[3] 1	
Yaws							3		3	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 6 recurrent cases.
[3] Reported in the Canal Zone only.

Puerto Rico

Notifiable diseases—5 weeks ended July 29, 1949.—Cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	22	Syphilis	82
Diphtheria	24	Tetanus	16
Dysentery, unspecified	4	Tetanus, infantile	2
Gonorrhea	122	Tuberculosis (all forms)	685
Influenza	177	Typhoid fever	15
Malaria	22	Typhus fever (murine)	7
Measles	7	Whooping cough	141
Poliomyelitis	2		

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended July 23, 1949.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		13	2	18	77	13	53	38	51	265
Diphtheria				1		1				2
Dysentery, bacillary				1						1
Encephalitis, infectious							1			1
German measles		3		6	4		26	18		57
Influenza		6			3	2	2			13
Measles		27		76	90	42	202	125	220	782
Meningitis, meningococcal					3					3
Mumps		24	1	10	63	6	7	7	42	160
Poliomyelitis				34	66	2		2	18	122
Scarlet fever				15	17		3	8	3	46
Tuberculosis (all forms)		3	29	138		21	15	18	17	241
Typhoid and paratyphoid fever				5	2				8	15
Undulant fever				1		1				2
Venereal diseases:										
Gonorrhea	1	20	7	88	54	37	11	33	112	363
Syphilis		4	5	60	25	11	4	11	15	135
Other forms									1	1
Whooping cough		10		63		2	2		8	85

Newfoundland cases: Diphtheria 2; gonorrhea 1; syphilis 3.

INDIA

Bombay—Poliomyelitis.—Information dated August 1, 1949, states that 63 new cases of poliomyelitis were officially reported by doctors in Bombay during July 1949. Cases of this disease had been reported by months since January 1, 1949, as follows: January, 2; February, none; March, 4; April, 3; May, 10; June, 16. The number of deaths from poliomyelitis reported since the first of the year totaled 22, of which 18 were stated to have occurred in July.

MADAGASCAR

Notifiable diseases—May 1949.—Notifiable diseases were reported in Madagascar and Comoro Islands during May 1949 as follows:

Disease	May 1949			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi			4	0
Bilharziasis	2	0	105	0
Cerebrospinal meningitis			3	0
Diphtheria	1	0	1	0
Dysentery, amebic	20	0	260	6
Erysipelas			16	1
Influenza	88	0	3,353	45
Leprosy			28	1
Malaria	472	3	48,401	313
Measles	3	0	93	0
Mumps	3	0	86	0
Plague			4	3
Pneumonia, broncho	4	1	296	64
Pneumonia, pneumococcic			381	50
Poliomyelitis	1	0	1	0
Trachoma			3	0
Tuberculosis, pulmonary	9	2	132	24
Typhoid fever	5	0	12	1
Whooping cough			313	15

NEW ZEALAND

*Notifiable diseases—3 weeks ended May 21, 1949.**—During the 3 weeks ended May 21, 1949, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	1	1	Poliomyelitis	13	1
Diphtheria	3		Puerperal fever	4	
Dysentery:			Scarlet fever	54	
Amebic	1		Tetanus	2	
Bacillary	7		Tuberculosis (all forms)	104	47
Erysipelas	8		Typhoid fever	5	2
Food poisoning	2		Undulant fever	3	

*Report for May 28, 1949, not received.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Madras.—Information dated July 26, 1949, states that the Governor of Madras, as of July 22, 1949, declared the city of Madras threatened with an outbreak of cholera, and authorized compulsory

inoculation and other preventive measures. Cholera has been reported in that city in recent weeks as follows: Week ended July 23, 34 cases; week ended July 30, 35 cases; week ended August 6, 39 cases.

Smallpox

Manchuria—Port Arthur.—During the week ended July 16, 1949, 9 cases of smallpox were reported in Port Arthur, Manchuria.

Netherlands Indies—Java.—Smallpox has been reported in Java as follows: In Batavia, for the week ended July 30, 1949, 165 cases, week ended August 6, 222 cases; in Cheribon, week ended July 16, 89 cases, week ended July 30, 68 cases; in Bandoeng, week ended July 2, 25 cases; in Semarang, during the period July 1–31, 130 cases.

Yellow Fever

Ecuador.—On June 29, 1949, one death from yellow fever was reported in Oriental Region, Ecuador. This is stated to be the first case of yellow fever reported in Ecuador since 1919.

Gold Coast.—On July 25, 1949, one suspected case of yellow fever was reported in Bawdua, Oda Area, Gold Coast.

Panama.—On August 7, 1949, one fatal case of yellow fever was reported in Panama. The patient is stated to have contracted the disease in the jungle area of the Province of Colon. He died in Saint Tomas Hospital in Panama City.

Peru—Cuzco Department.—On April 15, 1949, one death from yellow fever was reported in Quincemil, Cuzco Department, Peru.

DEATHS DURING WEEK ENDED AUG. 6, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Aug 6, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,854	8,261
Median for 3 prior years	8,261	
Total deaths, first 31 weeks of year	290,472	291,931
Deaths under 1 year of age	737	676
Median for 3 prior years	676	
Deaths under 1 year of age, first 31 weeks of year	20,169	20,888
Data from industrial insurance companies:		
Policies in force	70,282,580	70,970,594
Number of death claims	12,934	11,668
Death claims per 1,000 policies in force, annual rate	9.3	8.6
Death claims per 1,000 policies, first 31 weeks of year, annual rate	9.4	9.7

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, U S. Government Printing Office, Washington 25, D. C.
Price 10 cents, Subscription price $4.00 a year

Public Health Reports

VOLUME 64 **SEPTEMBER 9, 1949** NUMBER 36

IN THIS ISSUE

Statisticians and Salaries in State Health Departments

Case Registers

Coxiella burnetii in *Rhipicephalus sanguineus*

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

CONTENTS

	Page
Distribution and salaries of directors of vital statistics and statisticians in State health departments as of August 1948. Daniel D. Swinney	1133
Case registers. Marjorie T. Bellows	1148
Spontaneous infection of the brown dog tick, *Rhipicephalus sanguineus* with *Coxiella burnetii*. R. R. Parker and Oscar Sussman	1159
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended August 20, 1949	1161
Communicable disease charts	1164
Plague in New Mexico:	
Report on two cases of plague in New Mexico in July	1165
Plague infection in Bernalillo County, New Mexico	1165
Territories and possessions:	
Hawaii Territory—Plague in fleas	1165
Foreign reports:	
Canada—	
Provinces—Notifiable diseases—Week ended July 30, 1949	1166
Ontario Province—Toronto City—Poliomyelitis	1166
Jamaica—Notifiable diseases—5 weeks ended July 30, 1949	1166
Madagascar—Notifiable diseases—June 1949	1167
New Zealand—Notifiable diseases—4 weeks ended June 25, 1949	1167
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Plague	1167
Smallpox	1168
Yellow fever	1168
Deaths during week ended August 13, 1949	1168

Public Health Reports

Vol. 64 • SEPTEMBER 9, 1949 • *No. 36*

Distribution and Salaries of Directors of Vital Statistics and Statisticians in State Health Departments as of August 1948

By DANIEL D. SWINNEY*

The rapid expansion of public health programs has accelerated a widespread demand for more and better statistical information. Statistical data are being used increasingly as a tool in administrative planning and evaluation, as well as in research and interpretation of the health needs of the community to the public. The supply of statisticians trained in public health has not been commensurate with this growth. Foremost among the problems arising from this shortage are considerations of professional qualifications, definitions of function, and the level of compensation offered. This paper is the third in a series of descriptions and analyses of the organization and structure of statistical activities in State health departments (*1*, *2*). It analyzes the distribution of the positions of directors of vital statistics and statisticians and their salaries from data in the August 1948 pay rolls of State health departments submitted to the U. S. Public Health Service for a cooperative study sponsored by the Service, the American Public Health Association, and the State and Territorial Health Officers Association. Data on the position qualifications are from the official classification plans submitted by the States to the Public Health Service for review and approval.

Although the titles of the various statistical positions are approximately the same, wide differences among States may be noted in job descriptions, actual duties, and qualifications for these positions. The term "statistician" or "director of vital statistics" is used at times for clerical workers engaged in the routine collection or tabulation of records or reports, or their supervisors. It is also used for persons responsible for intricate statistical analyses, as well as for persons with broad administrative and technical responsibility for the collection and analysis of vital records and other health department reports.

*Public health administrator, Division of Public Health Methods, Public Health Service.

The classifications for directors of vital statistics and statisticians used by the Committee on Remuneration and Standards (*4*) of the Vital Statistics Section of the American Public Health Association are used in this paper, except that no distinction is made between junior and senior statisticians. These classifications are as follows:

1. Directors of vital statistics:

(*a*) Registrars—Chiefs of a statistical unit engaged primarily in the registration of births, deaths, marriages, and divorces. Responsible for policy in relation to registration matters and at times for analysis of the registration function but not engaged in analysis with regard to health department activities as a whole.

(*b*) Chief statistician-registrars—Chiefs of a combined registration and analysis unit. These combine the duties of the registrar in the registration group and the chief statistician in the statistical group.

2. Statisticians (all persons listed on pay rolls as statisticians, public health analysts, statistical aides, or biometricians):

(*a*) Chief statisticians—Workers engaged in this category are chiefs of a statistical unit engaged primarily in analytical work exclusive of registration activity. In coordination with other activities of the health department they are responsible for the development of a statistical program from the planning stages through the final analysis and presentation of results. They exercise considerable independence of action within the broad policies laid down by the health commissioner.

(*b*) Senior statistician—Under the general supervision of the registrar and/or chief statistician they are responsible for analysis of a high order of technical competence demanding a good general knowledge of public health. May consult with chiefs and other personnel of the health department with regard to planning of a study, collection of data, tabulation and analysis of results. Under general supervision only, may initiate studies and exercise considerable independence of action within broad policy lines laid down by the chief. Analytical work not confined to one particular aspect of public health.

(*c*) Junior statistician—Individuals in this class are usually under the immediate and fairly close supervision of the senior statistician. They do not confer, except on rare occasions, with chiefs of other divisions. They may supervise a small clerical or tabulating force or be responsible for some tabulating work.

Number Employed

As of August 1948, the 48 State health departments employed 47 directors of vital statistics, 39 as registrars of vital statistics and 8 as

chief statistician-registrars (table 1). The latter have broad responsibilities for statistical operations in their departments as well as for the registration of vital records. In one State (Massachusetts) the registrar of vital records is in the Department of State and not in the health department.

Table 1. *Distribution of directors of vital statistics and statisticians employed in State health departments, by number employed per department as of August 1948*

Statisticians per department [1]	Number State health departments	Number directors of vital statistics		Number statisticians	
		Registrars	Registrar-chief statistician	Chief statistician	Statistician
Total	48	[2] 39	8	4	102
None	16	16	0	0	0
1	15	14	1	1	14
2	7	6	1	2	12
3	3	0	3	0	9
5	3	1	1	0	15
6	1	0	1	0	6
13	1	1	0	1	12
17	2	1	1	0	34

[1] Text and tables of this report exclude directors of vital statistics in considering number of statisticians per health department.
[2] The position of registrar was vacant in 1 State, and 1 State (Massachusetts) does not have the position of registrar within the State health department.

The 48 health departments had 102 statisticians and 4 chief statisticians, approximately one-third of whom were in 2 States. Five States had an additional third of the total, while 25 States accounted for the remaining third. Sixteen States had no statisticians in their health departments, although in some of these States the directors of vital statistics were qualified statisticians. At least a majority of the States appear to be without sufficient professional personnel for adequate research and statistical programs.

Established Positions

State health departments have established 94 classes [1] of statistical positions, only 53 of which were filled by the 106 statisticians that were employed in August 1948 (table 2). Ten States had not established classes of positions for statisticians other than for the director of vital statistics. Six States which did not employ any statisticians had an average of two unfilled classes of statistical positions. The remaining 32 States have an average of one unfilled class.

[1] Under civil service or merit system regulations, positions are grouped into classes on the basis of ability to subject them to common treatment with respect to compensation, selection, and other personnel actions. For example, a class may be established for senior statistician, without regard to the division or service in which the position or positions will be located. Each division or service may, if necessary, appoint a senior statistician under this class, and each incumbent will receive the same compensation and have the same general responsibilities and minimum qualifications.

Table 2. *Distribution of established*[1] *classes of statistical positions in State health departments, by number of statisticians employed per State as of August 1948*

Number statisticians employed per State	Number States having established positions	Number of established classes of positions		
		Total	Filled	Unfilled
Total	38	94	53	41
None	6	12	0	[2] 12
1	15	31	[2] 15	[3] 16
2	7	18	[3] 11	[2] 7
3	3	8	6	[2] 2
5	3	7	7	0
6	1	3	2	[2] 1
13	1	4	[2] 4	0
17	2	11	8	3

[1] Established in classification plan, but not necessarily in budget.
[2] Includes 1 class for chief statisticians.
[3] Includes 2 classes for chief statisticians.

Vacancies

Approximately 45 percent of the classes of statistical positions which were established in the classification plans of State health departments as of August 1948 were unfilled. If only one position per vacant class were filled, the current number of statisticians employed would be increased by approximately 30 percent.

In several of the States there may be no intention of filling the existing vacancies in statistical positions. In other States, funds are not available; the positions as established are outdated, or they are not being filled for other reasons. In addition, several States had vacancies within the classes in which some personnel are already employed. In spite of the foregoing qualifications, these data are indicative of the fact that there are many statistical positions which have been established but not filled.

Salary Scales

Data on salaries are difficult to evaluate. Theoretically, compensation is based on the levels of responsibility involved, the nature of the experience and training required to perform the duties inherent in a particular position, and the salary levels of similar positions. It is based also on supply and demand in relation to labor market and cost of living.

Actually, extreme differences appear among States and within individual health departments in content, scope, and importance of the responsibilities of the positions involved. Thus salary comparisons are useful only to describe current levels and to point up existing anomalies. Evaluation must await accurate and precise data on the functions performed and levels of responsibility involved in individual positions. In this report the comparisons are made on the basis of job titles alone.

Table 3. *Distribution of directors of vital statistics and statisticians in State health departments, by salary as of August 1948*

Position	Number positions	Salary												
		Under $2,000	$2,000–2,499	$2,500–2,999	$3,000–3,499	$3,500–3,999	$4,000–4,499	$4,500–4,999	$5,000–5,499	$5,500–5,999	$6,000–6,499	$6,500–6,999	$7,000–7,499	Over $7,500
Total	152	[1] 1	20	37	18	23	20	13	9	2	4	1	3	[2] 1
Directors of vital statistics:														
Registrars	[3] 38	0	0	5	3	3	7	8	4	2	3	0	2	1
Chief statistician-registrars	8	0	0	0	0	1	1	1	2	0	1	1	1	0
Chief statisticians	4	0	0	0	0	0	2	0	2	0	0	0	0	0
Statisticians	102	1	20	32	15	19	10	4	1	0	0	0	0	0

[1] $1,920.
[2] $8,800.
[3] Excludes the registrar of Massachusetts who is not under the department of health and the registrar of Tennessee where a vacancy exists.

Wide ranges are found in the distribution of the salaries of directors of vital statistics and statisticians employed in State health departments (table 3). Median salary intervals for the directors of vital statistics who served both as registrar and chief statistician were higher than for those serving only in the capacity of registrar, although the range of salaries was broader for the latter.

The salary ranges and medians for the groups were:

Class	*Salary range*	*Median interval*
Registrars	$2, 520–$8, 800	$4, 500–$4, 999
Chief statistician-registrars	3, 768– 7, 260	5, 000– 5, 499
Chief statisticians	4, 000– 5, 400	4, 500– 4, 999
Statisticians	1, 920– 5, 490	2, 500– 2, 999

The salaries of directors of vital statistics and statisticians, distributed according to the number of statisticians employed as of August 1948, reflect wide differences in the organization and content of statistical activities rather than any positive correlation between the number employed and their salary levels (table 4). The median salary of directors of vital statistics in health departments employing one or no statisticians lay in the interval of $4,000–$4,499, while for those in departments employing more than one statistician the median was in the $5,000–$5,499 interval. The median salary interval of statisticians in departments employing one or two statisticians was $3,000–$3,499, while in the department employing 13 it was $2,000–$2,499.[2]

[2] This department has employed a proportionately large group of junior staff members with suitable backgrounds for further training; in the two departments with only one or two statisticians emphasis has been placed on obtaining personnel already trained for higher responsibilities.

Table 4. *Distribution of directors of vital statistics and statisticians in State health departments by number of statisticians employed per department, by salary as of August 1948*

Number statisticians employed per department	Number States with designated number of positions	Total number positions	Salary												
			Under $2,000	$2,000–$2,499	$2,500–$2,999	$3,000–$3,499	$3,500–$3,999	$4,000–$4,499	$4,500–$4,999	$5,000–$5,499	$5,500–$5,999	$6,000–$6,499	$6,500–$6,999	$7,000–$7,499	$7,500 and over
Total	-------	152	1	20	37	18	23	20	14	8	2	4	1	3	1
Directors of vital statistics [1]	47	[2] 46	0	0	5	3	4	8	9	6	2	4	1	3	1
None	16	16	0	0	3	2	2	3	2	1	2	1	0	0	0
1	15	15	0	0	2	1	2	4	3	1	0	1	0	1	0
2	7	7	0	0	0	0	0	0	3	2	0	1	0	1	0
3	3	3	0	0	0	0	0	0	0	2	0	0	0	1	0
5	2	2	0	0	0	0	0	0	1	0	0	0	1	0	0
6	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0
13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	2	2	0	0	0	0	0	0	0	0	0	1	0	0	1
Statisticians	48	106	1	20	32	15	19	12	5	2	0	0	0	0	0
None	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	15	15	0	3	3	3	3	2	1	0	0	0	0	0	0
2	7	14	0	2	4	2	2	3	1	0	0	0	0	0	0
3	3	9	0	1	4	2	1	0	1	0	0	0	0	0	0
5	3	15	0	2	6	5	2	0	0	0	0	0	0	0	0
6	1	6	0	3	3	0	0	0	0	0	0	0	0	0	0
13	1	13	1	8	2	1	0	0	0	1	0	0	0	0	0
17	2	34	0	1	10	2	11	7	2	1	0	0	0	0	0

[1] Includes registrars (or assistant registrar, where health officer is legal registrar) and chief statistician-registrars.
[2] Excludes director of vital statistics for Massachusetts and Tennessee.

The differences between the salaries of the directors of vital statistics and the directors of other selected programs are striking (table 5). In this comparison, the salaries for program directors who are required to have an M. D. degree as a major qualification have been grouped together under Medical. The salaries of directors of vital statistics are about the same as for the nursing directors, but are higher than

Table 5. *Comparison of the salaries of directors of vital statistics and other selected program directors in State health departments as of August 1948*

Percentage difference in salaries	Number of States having indicated difference in salaries between directors of vital statistics and other specified program directors				
	Medical	Sanitation	Laboratories	Nursing	Public health education
Total	48	48	48	48	48
No difference	4	3	5	4	2
Lower:					
Under 20	0	3	1	10	6
20–39	0	0	0	6	3
40–59	0	0	0	1	0
60–79					
80–99	----------	1	----------	----------	----------
Higher:					
Under 20	9	6	13	13	4
20–39	11	14	8	6	4
40–59	8	11	7	2	0
60–79	6	5	4	1	1
80–99	5	1	3	1	0
100 and over	3	2	3	0	0
No data	3	2	4	4	28

those for the directors of public health education, and are consistently lower than those of the directors of medical programs, sanitation, and laboratories. The median salary for directors of vital statistics is 40 to 49 percent lower than that for medical directors, and 20 to 29 percent lower than the median for directors of sanitation and of laboratories. In a few States, however, the salaries for all directors are on the same administrative level.

In a study of the salaries of State public health workers which was released in October 1948 by the Public Health Service, the average annual salaries of selected health department division directors were computed for August 1948 (*3*). For the directors of vital statistics the over-all salary was $4,802—substantially lower than that for all other directors except directors of nursing which averaged $4,722. The figures are as follows:

Position	*Average salary August 1948*
Health officers	$8, 247
Directors:	
Local health services	7, 364
Maternal and child health	6, 829
Venereal disease control activities	7, 017
Tuberculosis control	7, 311
Public Health dental services	6, 211
Sanitary engineering	6, 528
Laboratory services	6, 394
Public nursing	4, 722
Vital statistics	4, 802

The fact that the averages are higher in general for medical, sanitation, and laboratory directors is not surprising since most of them have more responsibility in their positions than do the directors of vital statistics. In respect to these fields of activity there is more uniformity and agreement concerning job content and needed personnel qualifications, not only within their professions but by civil service agencies, legislatures, and other salary determining bodies, than there is for the directors of vital statistics. This factor may affect the level of responsibility assigned to the positions and the resultant salary levels. There is little agreement concerning the position of director of vital statistics (*4*) where functions range from the direction and routine tabular analysis of a registration program limited to births and deaths to the direction of all registration activities, including intensive statistical analysis and consultation service for the health department as a whole. There is no agreement as to what training is necessary for the position of director of vital statistics. Some State officials believe that the primary prerequisite for the position is proved administrative ability, while others think statistical training and experience are equally important.

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The study (4) cited in the foregoing paragraphs also showed that the following median salaries for professional public health personnel other than the health officers and the directors of programs fell within the following ranges:

Occupational group	*Median salary August 1948*
Medical personnel	$6, 200–$6, 400
Sanitary engineers	4, 200– 4, 400
Health educators	3, 400– 3, 600
Supervisory and consultant public health nurses	3, 300– 3, 400
Nutritionists	3, 200– 3, 400
Professional laboratory personnel	3, 000– 3, 200
Sanitation personnel	2, 800– 3, 000
Staff level public health nurses	2, 400– 2, 500
Graduate registered nurses	2, 100– 2, 200

The range within which the median salary fell for professional statistical workers computed from the same source as that used for the tabulation above—namely, salaries for personnel appearing on the State health department pay rolls in August 1948—was $2,800–$3,000. The median salary of statisticians was thus the lowest except for general sanitation personnel, staff-level public health nurses, and graduate registered nurses.

The salary levels for statisticians may reflect the lack of homogeniety both in the degree of responsibility assigned to them in many areas and/or in the lack of understanding of their functions by administrative and salary determining officials. In general, a doctor's, an engineer's, a bacteriologist's, or nurse's general functions can be assumed from the nature of his or her training. Such an assumption cannot be made in respect to health department statisticians without inquiry into the individual's specific background and his current duties and responsibilities.

Relation of Salaries to Total Expenditures

Another factor to be considered in analyzing the salary structure is whether salary levels are related to the size of the health department and the area it serves. An appropriate index of size is total expenditures for public health. Gross expenditures seem preferable to per capita expenditures when size of operations is the factor to be considered. In this ranking, State health departments of approximately the same size fall in close proximity, whereas a per capita ranking places States like New York, Maryland, Nevada, and Delaware on approximately the same level.

Table 6 shows this distribution when the States are ranked by quartiles according to their total expenditures for public health during the period July 1, 1947 to June 30, 1948. As would be expected, the number of statisticians increased in general as the expenditures in-

Table 6. *Distribution of statisticians and directors of vital statistics in State health departments, by salary and quartile grouping of States according to total public health expenditures in 1947* [1]

Salary interval	Number of directors of vital statistics				Number of statisticians			
	Quartile grouping				Quartile grouping			
	Uppermost [2]	Second [3]	Third [4]	Lowest [5]	Uppermost [2]	Second [3]	Third [4]	Lowest [5]
Total	11	11	12	12	58	28	15	5
Under $2,000	0	0	0	0	0	1	0	0
$2,000–$2,499	0	0	0	0	3	10	4	3
$2,500–$2,999	0	0	0	5	17	6	8	1
$3,000–$3,499	0	0	1	2	10	4	1	0
$3,500–$3,999	0	0	4	0	16	1	1	1
$4,000–$4,499	1	2	2	3	9	3	0	0
$4,500–$4,999	1	5	1	2	2	2	0	0
$5,000–$5,499	1	2	3	0	1	1	1	0
$5,500–$5,999	2	0	0	0	0	0	0	0
$6,000–$6,499	2	1	1	0	0	0	0	0
$6,500–$6,999	1	0	0	0	0	0	0	0
$7,000–$7,499	2	1	0	0	0	0	0	0
$7,500 and over	0	0	0	0	0	0	0	0
Number of States without designated personnel	1	1	0	0	2	2	5	7

[1] Excluding expenditures for general and mental hospitals, TB sanatoriums, and capital investments.
[2] California, Georgia, Illinois, Massachusetts, Maryland, Michigan, New York, North Carolina, Ohio, Pennsylvania, Texas, Virginia.
[3] Alabama, Connecticut, Florida, Kentucky, Louisiana, Mississippi, Missouri, New Jersey, South Carolina, Tennessee, Washington, Wisconsin.
[4] Arkansas, Colorado, Indiana, Iowa, Kansas, Maine, Minnesota, New Mexico, Oklahoma, Oregon, West Virginia, Utah.
[5] Arizona, Delaware, Idaho, Montana, Nebraska, Nevada, New Hampshire, North Dakota, Rhode Island, South Dakota, Vermont, Wyoming.

creased; 50 percent of all positions were in the highest quartile of States, while less than 5 percent were in the lowest quartile where 7 States had no statisticians in their health departments. The salary levels also appear to be affected by total expenditures. The median salary interval for the highest quartile of States was $1,000 above that for the lowest quartile and $500 above that for the second and third quartiles. For the directors of vital statistics there was a much greater spread of salaries between quartiles than there was for statisticians. The median salary for the highest quartile was in the interval $6,000–$6,499, while for the lowest quartile it was $3,000–$3,499; the medians for the second and third quartiles were in the $4,500–$4,999, and $4,000–$4,499 intervals, respectively.

Salaries in Relation to Type of Organization

An analysis of the distribution of the salaries of directors of vital statistics and statisticians classified as to types of statistical organization (*2*) in the 48 State health departments (table 7) indicates in general a positive relationship between salary levels and type of organization. The exceptions were in the large and/or highly organized States departments. The median salary for the directors of vital

statistics in the 17 States having only a division of vital statistics lay in the $4,000–$4,499 interval; it was in the $5,000–$5,499 interval in the 6 States having a centralized statistical division, and it was $4,500–$4,999 in those with other types of organizations.

Table 7. ***Distribution of statisticians and directors of vital statistics, by salary and type of statistical organization in State health departments, October 1947***

Salary interval	Number of statisticians					
	Total	Type of statistical organization				
		No formal statistical organization for analysis [1]	Division of VS with some centralized statistical services	Division of VS with independent central tabulating unit	Central statistical division with independent division of VS	Central statistical division
Number of persons	106	14	16	24	18	34
Under $2,000	1	0	0	0	1	0
$2,000–$2,499	20	5	0	0	8	7
$2,500–$2,999	32	4	5	9	3	11
$3,000–$3,499	15	2	7	2	2	2
$3,500–$3,999	19	2	3	4	0	10
$4,000–$4,499	12	0	1	8	2	1
$4,500–$4,999	4	1	0	1	0	2
$5,000–$5,499	3	0	0	0	2	1
$5,500–$5,999	0	0	0	0	0	0
$6,000–$6,499	0	0	0	0	0	0
$6,500–$6,999	0	0	0	0	0	0
$7,000–$7,499	0	0	0	0	0	0
$7,500 and over	0	0	0	0	0	0
Number of States without designated personnel	-----	12	3	1	0	0

Salary interval	Number of directors of vital statistics					
	Total	Type of statistical organization				
		No formal statistical organization	Division of VS with some centralized statistical services	Division of VS with independent central tabulating unit	Central statistical division with independent division of VS	Central statistical division
Number of persons	46	17	14	6	3	6
Under $2,000	0	0	0	0	0	0
$2,000–$2,499	0	0	0	0	0	0
$2,500–$2,999	5	4	1	0	0	0
$3,000–$3,499	3	3	0	0	0	0
$3,500–$3,999	4	1	2	1	0	0
$4,000–$4,499	8	3	3	1	0	1
$4,500–$4,999	9	2	2	2	2	1
$5,000–$5,499	6	2	1	0	1	2
$5,500–$5,999	2	1	1	0	0	0
$6,000–$6,499	4	0	2	1	0	1
$6,500–$6,999	1	0	1	0	0	0
$7,000–$7,499	3	1	1	0	0	1
$7,500 and over	1	0	0	1	0	0
Number of States without designated personnel	2	1	0	0	1	0

[1] No formal statistical organization for analysis—no statistical organization having functions covering the entire health department other than the Division of Vital Statistics.

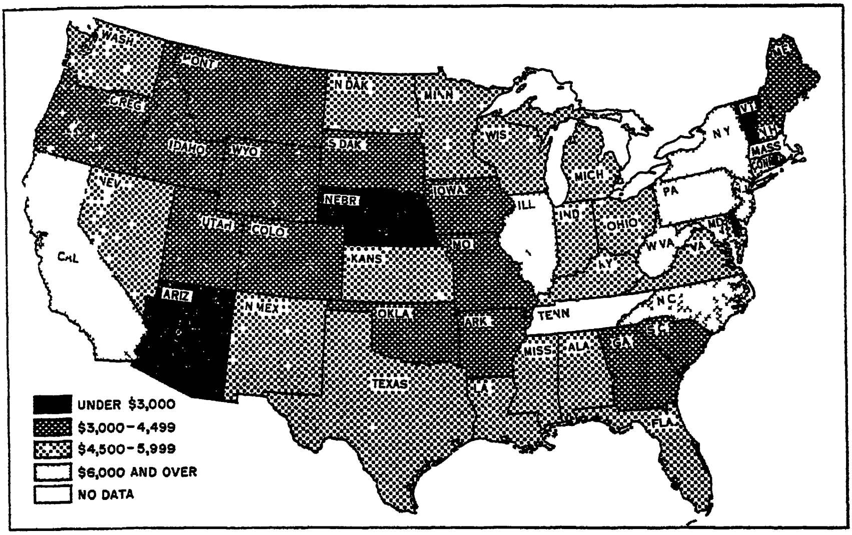

Figure 1. Salaries of directors of vital statistics in State health departments as of August 1948.

The variation was even greater in the medians for statisticians' salaries. Where there were central statistical organizations there were more statisticians; the range of salaries was broader, and the median salary was lower. The latter may be explained by the fact that more statisticians in the lower grades were employed.

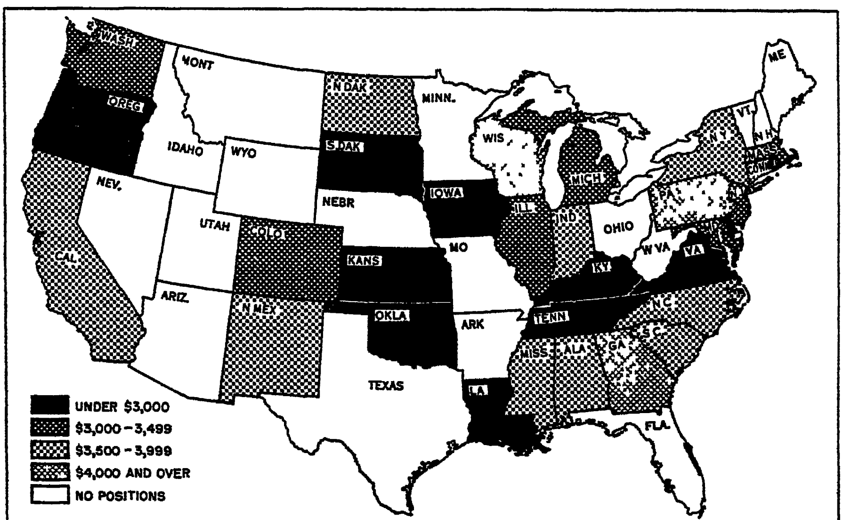

Figure 2. Median salaries of statistical positions in State health departments as of August 1948.

The geographic distribution of the salaries received by the directors of vital statistics as of August 1948 indicates no apparent patterns other than that salaries paid in the Rocky Mountain States were all in the lowest salary range (fig. 1). Those States are sparsely populated and have a low coverage of local health services. California was the only State west of the Mississippi River paying a salary of $6,000 or over. With the exception of Illinois, the other States having salaries in this range were on the Eastern seaboard.

Figure 2 shows the geographic distribution of the salaries received by the statisticians employed in State health departments. Eleven of the 16 State health departments employing statisticians as of August 1948 were west of the Mississippi River. Except in Colorado, departments in the Rocky Mountain area were void of statisticians. Only in 4 States (Connecticut, Georgia, Pennsylvania, and Wisconsin) was the median salary $4,000 or more; in 17 States it was under $3,000.

Education and Experience Required

Qualifications for appointment provide some indication of the salary level and responsibilities of the positions under consideration, and of the general level of attainment likely to exist among incumbents. Table 8 shows the median salary intervals of the directors of vital statistics and of statisticians according to the minimum educational qualifications and median years of experience that were required. The median salary interval of chief statistician-registrars was $500 higher than that for the directors who were registrars. For the 15,

Table 8. *Median salary intervals of directors of vital statistics and statisticians employed in State health departments, by minimum educational qualifications and median years' experience required for position as of August 1948*

Educational requirements and median years' experience required	Directors of vital statistics: Registrars: Number	Directors of vital statistics: Registrars: Median salary interval	Directors of vital statistics: Chief statistician-registrars: Number	Directors of vital statistics: Chief statistician-registrars: Median salary interval	Chief statisticians: Number	Chief statisticians: Median salary interval	Statisticians: Number	Statisticians: Median salary interval
Total	38	$4,500–$4,999	8	$5,000–$5,499	4	$4,500–$4,999	102	$2,500–$2,999
Less than college graduate but 3–4 years' experience	15	3,500–3,999	[1] 1	7,000–7,499	[1] 1	5,000–5,499	29	2,000–2,499
College graduation, 1–2 years' experience	7	5,000–5,499	4	4,750–5,249	1	4,000–4,499	59	3,000–3,499
1 year or more of postgraduate education plus 1–2 years' experience	15	4,500–4,999	3	5,000–5,499	2	4,500–4,999	6	2,500–2,999
Not specified or unavailable	1	6,000–6,499	0		0		8	3,000–3,499

[1] No educational requirements are set for these positions.

or approximately 40 percent, of the registrars in positions for which college graduation was not required, the median salary was in the interval $3,500–$3,999, or $1,000 below the median for all registrars. The median salary interval for the four chief statisticians was $4,500–$4,999, corresponding to that of the two in positions for which a year or more of postgraduate education was required. Of the 102 statisticians, 29 were in positions not requiring a college degree; their median salary interval was $2,000–$2,499, or $500 less than that for the 6 in positions requiring a year or more of postgraduate education. The latter interval of $2,500 to $2,999 corresponds to the median for the statisticians as a whole. The median for statistical positions requiring college graduation was higher than for those requiring a year or more of postgraduate education, probably reflecting the fact that a few departments had recruited for training purposes junior professional personnel with advanced educational preparation.

Although there is little agreement as to the content and scope of the functions of either directors of vital statistics or statisticians, most persons in the field of public health hold that basic knowledge of statistics per se is needed. Nevertheless more than one-third of the directors of vital statistics and statisticians were in positions that did not require courses and/or experience in statistics (table 9). Moreover, no direct relationship appears between such requirements and salary levels. The lowest median salary interval for the directors of

Table 9. *Median salary intervals of directors of vital statistics and statisticians employed in State health departments according to statistical content of educational and experience requirements, as of August 1948*

Statistical content of educational and experience requirements	Directors of vital statistics: Registrars: Number	Directors of vital statistics: Registrars: Median salary interval	Directors of vital statistics: Chief statistician-registrars: Number	Directors of vital statistics: Chief statistician-registrars: Median salary interval	Chief statisticians: Number	Chief statisticians: Median salary interval	Statisticians: Number	Statisticians: Median salary interval
Total	38	$4,500–$4,999	8	$5,000–$5,499	4	$4,500–$4,999	102	$2,500–$2,999
Statistics courses required with:								
Specialized experience [1]	7	4,500– 4,999	4	5,000– 5,499	2	4,500– 4,999	16	3,500– 3,999
General statistical experience	2	4,250– 4,749	1	4,500– 4,999	0	------------	14	2,500– 2,999
Nonstatistical or no statistical experience	6	4,000– 4,499	0	------------	1	4,000– 4,499	28	3,000– 3,499
Statistics courses not required with:								
Specialized experience [1]	9	4,000– 4,499	1	3,500– 3,999	0	------------	0	------------
General statistical experience	5	5,000– 5,499	1	6,500– 6,999	1	5,000– 5,499	15	2,000– 2,499
Nonstatistical or no experience	8	4,500– 4,999	1	7,000– 7,499	0	------------	21	3,500– 3,999
Not specified or not available	1	6,000– 6,499	0	------------	0	------------	8	3,000– 3,499

[1] Experience in public health or vital statistics.

vital statistics, however, was for those in positions requiring statistics courses without statistical experience or vice versa. The median salary interval for statisticians in positions requiring courses in statistics and specialized experience was $1,000 higher than for the group as a whole.

In view of the shortage of statisticians, the minimum and maximum salaries authorized for the vacant classes of positions are of interest. These data are shown in table 10. Only 20 percent of them pay starting salaries of more than $4,000. In a period of short labor supply the immediate prospects of filling such positions with trained personnel at these salaries are not promising.

Table 10. *Distribution of 41 unfilled classes* [1] *of statistical positions in State health departments, by minimum and maximum salaries as of August 1948*

Salary interval	Number of positions specifing salary as— Minimum	Number of positions specifing salary as— Maximum	Salary interval	Number of positions specifing salary as— Minimum	Number of positions specifing salary as— Maximum
Total	41	41	$4,000-$4,499	3	6
Under $2,000	2	0	$4,500-$4,999	2	4
$2,000-$2,499	7	2	$5,000-$5,499	3	3
$2,500-$2,999	7	4	$5,500-$5,999	1	2
$3,000-$3,499	8	9	$6,000 and over	0	4
$3,500-$3,999	6	5	Unspecified	2	2

[1] Established in classification plan but not necessarily included in budget.

Summary

As of August 1948, there were 46 directors of vital statistics and 106 statisticians employed by State health departments. The distribution of statistical positions was sparse and uneven. Approximately one-third of the statisticians were employed by two departments. Another third were employed by 5 States, and the remainder by 25 States. Sixteen States did not employ any statistician. The 106 statisticians filled 51 classes of positions established by the civil service or merit systems, while there were 41 unfilled classes. Ten States had not even established any classes of statistical positions.

Salaries for both the directors of vital statistics and statisticians in general were low, and wide variations appeared in the duties, responsibilities, and qualifications required for the positions. The salaries of the directors of vital statistics ranged from $2,520 to $8,800, while the median fell within the interval of $4,500–$4,999. The range of statisticians' salaries was from $1,920 to $5,490, and the median was in the interval, $2,500–$2,900. Over one-third of the directors and the statisticians were in positions not requiring a college degree or courses or experience in statistics.

The salaries of the directors of vital statistics were consistently lower than those of the directors of medical and sanitation programs and of laboratories. They were approximately the same as those for nursing directors and higher than those for the directors of public health education. The salaries of statisticians were lower than for other professional personnel, except for general sanitation personnel, staff-level public health nurses, and graduate registered nurses.

The distribution of statistical personnel and salaries by the total amounts expended for public health, by types of statistical organization, and by geographic location reveal no highly significant patterns. In general, the number of statisticians and the level of their salaries increased with increasing total expenditures. Until the functions, responsibilities, and requirements for statistical positions are clarified and standards for qualifications are established, the vacancies, variations, and anomalies in functions and salary will doubtless persist.

ACKNOWLEDGMENT

Appreciation is expressed to the American Public Health Association, the State and Territorial Health Officers Association and the Bureau of State Services of the Public Health Service for permission to use the pay roll data submitted by the State health departments. Helpful assistance in the preparation of the paper was received from Dr. Antonio Ciocco and Isidore Altman, of the Division of Public Health Methods, Donald Simpson of the Bureau of State Services, and other staff members of the Public Health Service.

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Case Registers

By Marjorie T. Bellows*

The meaning of the term "register" as applied to public health recording systems is both variable and indefinite. It may refer to State or local indexes, to systems for accumulating follow-up statistics, to visible card equipment or to case reference files. The purposes of such so-called case registers are equally variable and, in practice, often undefined. As a result of this lack of definition of both terminology and function, most opinions with regard to the values or shortcomings of registers are subject to wide interpretation. Any discussion of the use of case registers must be preceded therefore, by agreement on the meaning of the term itself and common acceptance of certain basic concepts as to their characteristics and functions.

For purposes of this discussion a case register is a system of recording frequently used in the general field of public health which serves as a device for the administration of programs concerned with the long-term care, follow-up or observation of individual cases. If "recording system for program control" were not such an unwieldy substitution for the overworked term "register" it might simplify discussion. Although this definition sharply limits its application to the field of public health, the case register has general characteristics which give it a wider field of usefulness than will be discussed here.

Characteristics of Case Registers

The fact that changes in status of cases are recorded over a period of time is the single distinguishing difference between a case register and other recording systems. Reports of births and deaths, admissions to or discharges from service, reports of acute and chronic diseases, and census enumerations are all records of single events in the life of an individual and describe him at one particular time. Files of such reports, however arranged, are not case registers. On the other hand, if some single event, such as those listed above, is the starting point for a series of occurrences which is determined and recorded until some other terminating event takes place, the recording system evolved is a case register.

A registered population is a group of individuals who, for a specific reason such as going to clinic or being diagnosed in a certain way, have been selected for continuing follow-up, treatment, or observation. There are constant additions to this population of persons who have had the same things happen to them or who have done the same things.

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Follow-up continues either until it appears that such measures are no longer necessary or productive or until the person dies or moves out of range of the program. The case register is the mechanical system for keeping current information about this population which is subject to two types of changes: change of status of the individuals included, and change, by admission and withdrawals, in the population itself.

Mailing lists, membership files, personal charge accounts, and telephone registrations are similar populations. Indeed, there may be something to be learned from investigation of the mechanics developed by commercial agencies for such purposes.

Among the earliest true case registers used in health departments are those for typhoid carriers which in a few areas were established more than 30 years ago. It is important to the carrier himself and to the public that his carrier status be established beyond doubt and that it be known at all times whether or not he is still a carrier and where he lives and works. A system of recording to assure proper measures of control was obviously necessary and case registers were established.

There are many types of files or recording systems used in public health programs which are erroneously called case registers. The most frequent misuse of the term is its application to indexes of various sorts. The so-called "State crippled children's registers" are an example. These are usually indexes of cases reported on a voluntary basis by a limited group of agencies. There is rarely provision for obtaining any kind of current information for every case, for removal other than because a certain birthday has been reached or for periodic follow-up of every case. Because follow-up information may be received sporadically for a part of the population indexed, or even systematically for a special group, the file often is called a case register and sometimes is analyzed statistically as though current information were equally good for all cases listed. Certain cancer registers are built from case reports and checked only with duplicate reports or death certificates on which cancer appears as a cause of death. They are not registers because they provide neither for currency of status nor for systematic termination reports. They are merely indexes of reported cases from which certain deaths have been removed. There are some true cancer registers, nevertheless, where limited clinic or hospital populations are followed periodically until death. The index type of files may have perfectly legitimate uses but they should not be called case registers. The basic essentials of a case registration system are that continuous up-to-date records be kept for every individual in a certain population group and that the group itself, however limited, be defined and kept complete within that definition.

It should be noted that a case register need not be one special type of file in order to meet the criteria listed. The filing system, the clerical procedures to be followed, and the type of equipment used are details to be determined by the requirements and organization of the program served. Visible filing equipment has proved to be very adaptable for case register use. Its advantage is that a single visible file can replace two or three vertical files. This is because the visible edge can be used simultaneously for indexing, coding and signalling. Erroneously, some people conclude that any visible file is a case register or that all case registers should be set up on visible files. Either of these generalizations may lead to their use in specific situations where they may not be suitable; both confuse the discussion of case registers.

Function of Case Registers

The difference between good and bad case register systems depends largely on whether or not they are so organized that they serve as efficiently as possible the primary purposes for which they are intended. There are three fundamental functions of a good recording system for follow-up programs:

1. A mechanism is provided whereby continuity of service or follow-up can be maintained. Either by arrangement of records, by some system of signalling or by a special auxiliary file, a register can be made to indicate currently those individuals who require service or follow-up and what steps should be taken, and by whom, to see that they get it. In many programs initial follow-up steps, such as notices to attend clinic or requests for reports from private physicians, may be incorporated into the clerical routine of maintaining the register. In any case, referral of cases to the appropriate persons or agencies who must take some action should be a mechanical function of the register.

2. Since a continuous record is kept for each case, the register is a valuable coordinating reference file. It makes available in one place a means of locating basic information for an individual. If proper information is recorded, it permits rapid review of case histories. Since it cross-indexes by name of case all recorded services to patients it reveals duplications in service and lapses in care or supervision.

3. It is a source of administrative statistics. The appraisal of the value and efficiency of a program should be from the standpoint of the patient. In other words, statistics should answer questions such as: Does the patient get the service he needs or the service that the program aims to give him? How much service does he use? Is the service given at the time that he needs it? How rapidly in the course of the patient's life does the program achieve results? This sort of

question can be answered by an analysis of case summary records such as a register provides. Appraisal and evaluation of programs can be expressed in terms of their effect on patients rather than in terms of operations performed and service time spent by personnel.

These three functions should be carried out by some method in any well-administered service program. Any one of them requires a recording system which has all of those characteristics which are peculiar to case registers.

Program Requirements

It would seem unnecessary to point out that a program must meet certain requirements before a register will be of use, especially since these requirements appear to be essential to any good service program.

1. Administrative responsibility for the program must be clear cut. There is no point in setting up a control mechanism unless there is someone who has direct responsibility for operating the program. A register does not itself control but is a mechanism to be used by the person or agency who does.

2. Standards for care, follow-up or observation should be established. These should specify the kinds of services to be given to the various classes of persons included in the program. They should indicate also the approximate time intervals for service or follow-up and by whom such service or follow-up will be given. A register cannot guide procedures unless the procedures are clearly outlined.

3. There should be adequate facilities available for giving the service specified or doing the necessary follow-up. A register will not serve as a mechanism to see that procedures are carried out unless facilities for carrying them out are available.

All too often attempts have been made to set up a register as the first step in developing a program, in the belief that the register will somehow secure adequate and complete service. In one large city the local heart association secured several thousand dollars to be used for a rheumatic fever register. The health department, the school medical service, and a group of local pediatricians were "cooperating" in the project although none was clearly responsible for the direction of the program. There was no nursing service to take responsibility for follow-up. The register was to be set up in the office of the heart association where clerical service was available, although that organization had no function other than to stimulate public interest. A register in such circumstances would have been a complete waste of money. As a matter of fact the advisory committee, after discussion with a consultant on registers, wisely voted to give the register funds to a local children's hospital.

There are many populations being followed in public health programs for which case registers are adaptable and there will be more as public health activities are extended into the fields of chronic diseases and medical care. Clinic populations, hospitalization groups, medical care groups, chronic disease populations, school populations, all come under this general classification. Often where such populations are being followed effectively there are case register systems in effect. For example, in well-administered school health services, each child has a health record which accumulates information throughout his school life according to a fixed schedule of physical examinations and school nurse conferences. The school nurse usually has a special file of cases which require follow-up arranged according to date and type of follow-up required. Either this file or the basic health record may be signalled to show the reason why follow-up is necessary. Such a system constitutes a register of school children, despite the fact that it lacks the formalities which have become associated with case registers. The register is a tool which may be simple or complex depending on the job to be done. It is undoubtedly true that procedure and filing specialists could simplify and improve many registers now in use, but it should be recognized that they are always used in some form where there is an effective program of long term follow-up.

Case Register Maintenance

The close interdependence of the program and the register makes it difficult to separate discussion of register procedures from administrative procedures. A well-maintained register is one which serves as a constant check on the administrative conduct of a well-organized program.

A first principle in the maintenance of the register or of the program is that there be precise definition of cases to be given service, and therefore, of cases admitted to the register. Where the population covered is first identified through legal case reports, supplemental information usually must be obtained by some follow-up measures. Often it is necessary to verify the diagnosis, as is true in rheumatic fever where diagnosis is difficult and there is no specific diagnostic test. Admissions to continuing clinic services must be distinguished by definite criteria from the sporadic clinic visitants who "shop" for service, and from those patients who require several clinic visits before they can be classified as to diagnosis or other eligibility. Other classes of admissions, such as tuberculosis contacts, or crippled children, require precise definition to include persons who require service and exclude those for whom service is of little value. It is a function of the register to see that sufficient information is obtained to determine eligibility for registration and service, and to initiate, through

routine notices to the proper agencies, the necessary steps for securing additional information. While such procedures are essential for building a register for some well-defined, classifiable population, they are more essential to the program itself in assuring that time and money are not wasted in service to patients who do not need it or do not come within the scope of the program.

A second major requirement in maintaining the register and guiding the program is to select certain essential facts which describe the status of the patient and to see that information regarding them is kept current within definite time limits. The facts selected depend upon the objectives of the program. If, for example, sputum positive cases of tuberculosis require different follow-up by nurse and clinic from sputum negative cases, then sputum examination should be made at definite intervals in order to determine when the type of follow-up should change. The register should record current sputum status and indicate when the next sputum examination is due. The appropriate person can be notified when an examination is due if routine sputum report is not received. Similarly, the register, if properly set up, can initiate steps for checking on such things as the person or agency giving current medical supervision, whether or not recommendations have been carried out, or changes in diagnosis. Reporting forms and procedures can be devised so that much information required for supervision of cases and currency of information will be obtained routinely. Special measures for obtaining information will be necessary only when reports are not received. The procedures for both reporting and follow-up will vary, depending on the scope and aims of the program. While the procedures from the register clerk's standpoint maintain current information on every case, they result, practically, in getting service to the patient at the proper time. Good statistics will be available to measure effectiveness of the program in the same device that helps maintain continuity and, to some extent, quality of service to the patient.

A third basic principle is to have precise definition of cases to be terminated or withdrawn from the service and register. Services to the patient must be limited by one or more end-points such as maximum benefit to the patient, cure, age, death, withdrawal from the community or uncooperativeness of the patient. The terminating events or conditions are, of course, determined by the objectives of the program, except for such incidents as death or moving. Their definition is important in limiting service only to those patients who need, or will benefit from it. It is equally important if a register population is to be kept free from dead wood. The register is the device for noting when such end-points are reached, and notifying the proper persons or agencies. Much information, determining when

withdrawal occurs, can be obtained from routine reporting procedures, or interoffice exchanges of information, as in the case of death notification.

Administrative statistics for a register population are reliable only when admissions have been limited by clear definition, when proper intercurrent information has been accumulated systematically on every case, and when withdrawal has been accurately recorded both as to time and reason. A program has exactly the same requirements if it is to get the right services to the right people. A good program needs a well-maintained register, but a poorly conceived program cannot possibly have a good register or derive any benefit from one.

Functional Units

The functional parts of a case register are the follow-up system, case reference material, and a statistical system. These can be handled in a single file, which has been done with most systems set up on visible files, or they can be separated physically, which is often more efficient. The follow-up system may be located with a single person such as the nurse, who is responsible for follow-up, or in some instances may be as simple as a clinic appointment book kept in the clinic. In such cases it would be foolish to try to duplicate the follow-up system in the case reference file. If the follow-up file and case reference file are separated geographically, they must be compared and reconciled periodically.

The case reference material is usually most useful at some central point where the program is being administered and where clerical service is available. It is a waste of nurses' or physicians' time to burden them with keeping a register. The case reference file need not be located in the same place with detailed family or case histories, in which case provision must be made for exchange of information either by routing the detailed records through the case reference file or by some reporting system.

The statistical system in most programs is likely to be close to or incorporated in the case reference file, although there are some instances in which it may be separate. For instance, in New York City where extensive machine tabulation equipment is maintained in the central office, the tuberculosis register is split into two sections. The case reference files are kept in district offices together with special follow-up files. The statistical file, on punch cards, is kept in the central statistical office. A summary card for each case is kept up to date by means of "change" cards, the latter being punch cards on which the type of change is checked. They are sent in daily by the clerk who handles the case reference file. All changes in diagnosis, care, sputum status, address and other items are reported and the information is transferred mechanically to the summary card for the patient. The punch cards

are used as an aid in maintaining follow-up as well as for statistics. For example, machine lists of names and addresses of cases who are not under care and of active cases who have not had a sputum examination within certain periods of time are made up routinely and periodically for district offices. While this system is not at all practical for most local health departments, it illustrates the fact that there are no hard and fast rules that apply to all registers. Their functional elements must be arranged so that they will do certain specific things effectively, and as efficiently as possible.

Detailed register information is most useful to the person or agency administering the program and to those giving direct service. Its major components should be located therefore where they can be used most easily by all of the persons giving service—administrator, clinician, nurse and clerical staff. This is most often the smallest unit of organization that has responsibility for carrying out the complete program, such as the local health office, hospital or school.

A number of persons and agencies have advocated State registers. It is difficult to visualize many circumstances where the State office is close enough to service units for a register to be of any use other than as an independent source of State-wide statistics. States so small that they are the equivalent of local health districts, in that they give direct service, may be an exception. In general, the duplication of recording required for a State register, the limited amount of information that can be demanded in current reports by a State office from local health departments and the statistical inaccuracies attendant upon extensive duplication would make it highly probable that some better way of collecting statistics should be found if State-wide statistics must be had. Since local programs are rarely State-wide in coverage and are seldom alike in either objectives or methods of accomplishment, the propriety of trying to combine their respective statistics into State figures is highly questionable.

Register Statistics

Register populations are highly selected. Not only are they selected from the general population by the event or condition which brings them under observation but in addition they are some special part of the total population experiencing that event. Removals from the population are still more selected. Occasionally the selection is according to known measurable factors; more commonly it is according to unknown factors. Time changes in the population are in terms of person-years. The average administrator, requiring statistics to appraise and guide his program, feels that he needs statistical help when either selection or person-years or both, complicate his problem. The statistician, on the other hand, is intrigued with the possibilities

of follow-up data which, with some improvements, might permit exceedingly interesting studies. Perhaps with ulterior motives he has accepted responsibility for setting up the mechanical and clerical procedures involved in case registers. The administrator and statistician, although having common basic materials, are apt to have quite different ideas about the most interesting or profitable use that can be made of them. This difference in point of view has led to generalization on the part of both statisticians and administrators that case registers are over-rated, inefficient and unduly expensive. The fault lies not with the registers but with the use made of them.

The primary statistical function of registers is to provide good administrative statistics. Data for special statistical studies of chronic disease or of certain populations are merely a by-product. Whether in a given register such data are good or bad is irrelevant provided the register is serving its primary functions satisfactorily. The advisability of modifying register procedures so that they do provide certain special statistical data should be weighed carefully against the effect of such modifications on their legitimate functions. Sometimes very slight changes will do no harm, will cost little and will yield valuable research material. But situations often arise where statistical considerations may suggest changes in criteria for admission or discharge from a register which do not fit with the objectives of the program. They often result in expensive follow-up of cases in which the program has no interest. Such changes can easily decrease the usefulness of the register for its legitimate purposes, at the same time requiring nonproductive and apparently unnecessary activities on the part of the program staff. In such circumstances the result is apt to be carelessly collected and poor quality statistics.

There are few, if any, registers that can be made to show prevalence of a disease or condition. A possible exception is tuberculosis registers. In certain areas where the disease has been accurately diagnosed and reported for many years and where every reported case has been followed up regularly and frequently, the register may show something about prevalence. On the other hand, registers of rheumatic fever and rheumatic heart disease are not useful for obtaining statistics on prevalence. Diagnosis of this disease falls so far short of the ideal that even if complete registration of all cases diagnosed could be achieved, statistics on prevalence would be meaningless. But the rheumatic fever register is essential for operating a case follow-up program and its limitations in determining prevalence is beside the point. In general there are far better ways of obtaining prevalence data than by setting up or trying to use a case register.

Case register mechanics can be used in certain types of statistical studies for facilitating the accumulation of statistical information.

Such a research project as the study of chronic diseases in the Eastern Health District in Baltimore undoubtedly required a register of some sort. Individuals admitted to this study were defined as those living in or moving into certain houses. Persons who moved out of this group of houses were withdrawn from the study. Monthly follow-up reports were obtained by home visit to secure records of illnesses. Many studies of the incidence of specific chronic diseases might utilize such a register for a sample population as a tool for conducting the study, much as a service program uses them as a device for implementing the program. But it is rarely that a case register can be used simultaneously for statistical research and for administering a program without serious detriment to one or both. Service program objectives should always take precedence over statistical objectives.

Despite the fact that case registers do not necessarily produce data to the statistician's liking, there are certain obligations which the statistician should assume in increasing their efficiency for their intended purposes. The development of guides and forms, and of reporting and recording procedures, has been of great assistance to local administrators who often do not have statistical help. These guides may be a mixed blessing. They are designed for some one type of local organization, usually one that can be served by a single visible file. There is little suggestion as to how to modify procedures to meet local situations. The result is that the visible file is set up according to the guide but it may completely duplicate some other recording system which is quite adequate, or be located in a place where there is no one who needs it. The clerk who keeps the register does not know how to abstract administrative statistics and the administrator, if he knows what data could be obtained and how to get it, usually has no time to do it or to teach the clerk. Under such circumstances the register is an unduly expensive luxury.

Obviously, two things are needed: first, adaptation of general procedures to local situations, and second, guidance in administrative use of the register. Statisticians might well turn their attention to both problems. The latter requires development of methods for evaluating the effectiveness of programs. Program objectives should be studied and analyzed with and from the point of view of the persons administering the service. There are unlimited possibilities for utilizing register statistics to show whether or not services get to the persons for whom they are intended, and the effectiveness of such service in terms of the patient. After useful statistical indices are devised and tested, forms for routine periodic tabulations of data, and instructions for obtaining such tabulations from the register, may be developed. A guide for administrative use of the register is quite as necessary as the guide for clerical procedures.

Summary

A case register is an essential tool for the administration of many local public health programs, particularly those concerned with the long term observation of individuals. It is a device for assuring continuity of service or observation to every patient and a means of securing administrative statistics to guide and evaluate the program.

Registers can function only in programs where administrative responsibility is clearly designated, definite standards for service have been formulated, and adequate facilities for service are available. A good register is one in which admissions and withdrawals are clearly defined and pertinent intercurrent information is kept systemically for every case.

There are no hard and fast rules that apply to the mechanics of all registers. A register must be adapted to the local situation and it must be located where it will be of use in direct administration of the program.

The primary statistical function of case registers is for evaluation and direction of the program. A guide for administrative use of case register statistics is as necessary as a guide for mechanical procedures. Although data for special studies may be a by-product of certain registers, the collection of special statistics should never be allowed to impair the register's legitimate functions.

Spontaneous Infection of the Brown Dog Tick, *Rhipicephalus sanguineus* with *Coxiella burnetii*

By R. R. Parker, Ph. D.,* and Oscar Sussman, D. V. M.**

This paper reports the recovery of a strain of *Coxiella burnetii*, the rickettsia of Q fever, from a group of 18 brown dog ticks (*Rhipicephalus sanguineus*) collected early in June 1948 from a dog in Phoenix, Ariz. These ticks were tested at the Rocky Mountain Laboratory.

Test Data

The 18 ticks, all of which were alive, were soaked in merthiolate solution 1: 1000 for 1 hour and then were rinsed thoroughly in several changes of sterile distilled water. They were next triturated in 10 milliliters of saline solution. Two guinea pigs were each injected with 1 milliliter of the resultant suspension, one subcutaneously, the other intraperitoneally. The former was febrile from the fourth to the fourteenth day. Blood for the complement-fixation test was taken on the thirty-first day, and the guinea pig was challenged with Q fever rickettsiae on the thirty-second day. The animal injected intraperitoneally became febrile on the fifth day. It was sacrificed on the eighth day, and a saline suspension of spleen tissue was used to inject six first-passage guinea pigs, three subcutaneously (1 milliliter each) and three intraperitoneally (2 milliliters each). These animals became febrile from 3 to 5 days later. Two of those injected subcutaneously were sacrificed, one on the seventh and one on the ninth day, and impression smears for examination for possible rickettsiae were made from the indurated lesions at the site of injection. A saline suspension of spleen and liver tissue from one of these guinea pigs was used to inject two second-passage animals, one subcutaneously (1 milliliter) and the other intraperitoneally (2 milliliters). The third first-passage animal injected subcutaneously was sacrificed on the fifteenth day after blood was taken for the complement-fixation test. The three guinea pigs injected intraperitoneally had febrile periods of 10, 10, and 11 days, respectively. Blood for the complement-fixation test was taken from each animal on the twenty-third day, and on the next day each was challenged with Q fever rickettsiae.

Of the two second-passage guinea pigs, the one injected subcutaneously became febrile on the fourth day, was sacrificed on the seventh day, and its spleen was frozen and was stored under CO_2 refrigeration.

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The animal injected intraperitoneally was febrile from the second to the eighth day and died on the fifteenth day.

The following findings were indicative of Q fever:

1. The serum specimens from five guinea pigs (one original and four first-passage animals) were all positive by the complement-fixation test in dilution of 1:512 or greater.

2. One of the original guinea pigs and the three first-passage animals that were challenged with Q fever rickettsiae (Nine-Mile strain) remained afebrile, whereas each of six control animals reacted typically.

3. Organisms similar to *C. burnetii* were observed in the stained impression smears of the subcutaneous lesions of the two first-passage animals that were injected subcutaneously.

4. The gross pathology observed in sacrificed animals was that of Q fever.

5. Some of the surviving animals exhibited the eventual emaciation frequently observed in Q fever-infected guinea pigs.

Discussion

Although the occurrence of spontaneous infection of *R. sanguineus* with *C. burnetii* is here reported for the first time, the possibility of natural infection in this tick has been suggested by the following observations on experimentally infected material: (a) Cornelius B. Philip, of the Rocky Mountain Laboratory, has demonstrated stage-to-stage survival of *C. burnetii* and transmission by bite (1938, unpublished); (b) Blanc, Martin, and Maurice (*1*) in Morocco have also shown stage-to-stage survival of the rickettsia; and (c) Smith (*2*) in Australia has shown experimental transmission by bite and has also found that the feces are infectious (100,000,000 guinea-pig-infectious doses per gram, 65 days after collection) and will infect guinea pigs if applied to the abraded or unabraded skin.

Summary

Coxiella burnetii, the infectious agent of Q fever, has been recovered from naturally infected brown dog ticks (*Rhipicephalus sanguineus*) collected in June 1948 from a dog in Phoenix, Ariz.

REFERENCES

(*1*) Blanc, Georges, Martin, L.-A., and Maurice, A.: Le mérion (*Mériones shawi*) de la région de Goulimine est un réservoir de la virus de la Q fever marocaine. Compt. rend. Acad. d. Sc. **224**: 1673–1674 (1947).

(*2*) Smith, D. J. W.: Studies in the epidemiology of Q fever. 3. The transmission of Q fever by the tick, *Haemaphysalis humerosa.* Australian J. Exper. Biol. & M. Sc. **18**: 103–118 (1940).

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED AUGUST 20, 1949

Summary

A total of 3,420 cases of poliomyelitis was reported, an increase of only 8.4 percent (the preceding week's increase 29 percent), as compared with 3,157 last week, a 5 year (1944–48) median of 1,254, and 1,313 for the corresponding week last year (representing a 7-percent decline, but followed by increases through the succeeding 4 weeks). Currently, decreases were recorded in the South Atlantic and West South Central areas. Of the week's total, 2,672 cases (78 percent) occurred in the New England, Middle Atlantic, and North Central areas. Of 38 States reporting more than 10, 18 showed decreases of 1 to 56 cases (an aggregate decrease of 211). Current figures for 29 States reporting more than 20 cases each are as follows (last week's figures in parentheses): *Increases*—Massachusetts 189 (139), New York 601 (539), New Jersey 129 (101), Pennsylvania 69 (41), Ohio 209 (134), Illinois 348 (299), Michigan 329 (225), Iowa 114 (81), South Dakota 25 (16), Nebraska 41 (36), Kentucky 42 (33), Tennessee 41 (26), Colorado 60 (50), California 115 (106); *decreases*—Maine 40 (56), Connecticut 39 (45), Indiana 70 (126), Wisconsin 78 (84), Minnesota 136 (142), Missouri 103 (123), North Dakota 52 (58), Kansas 55 (56), Virginia 21 (26), West Virginia 29 (39), Arkansas 54 (60), Oklahoma 71 (92), Texas 104 (109), Idaho 33 (44), Washington 29 (38). The total for the year to date is 17,304, as compared with 9,743 for the same period last year and a 5-year median of 6,262.

One case of smallpox was reported during the week, in Kentucky, and a total of 132 cases of typhoid fever (last week 111, 5-year median 131), of which Texas reported 18, New York and Tennessee 12 each, and Pennsylvania 11.

Of 291 cases of typhoid and paratyphoid fever for the week ended July 30 (see graph, p. 1164), 180 were paratyphoid fever occurring in a Mexican camp in California.

Deaths recorded during the week in 94 large cities in the United States totaled 8,529 as compared with 8,813 last week, 8,115 and 8,385 for the corresponding weeks of 1948 and 1947, and a 3 year (1946–48) median of 8,115. The total to date is 307,814, same period last year 307,980.

Telegraphic case reports from State health officers for week ended August 20, 1949

(Leaders indicate that no cases were reported)

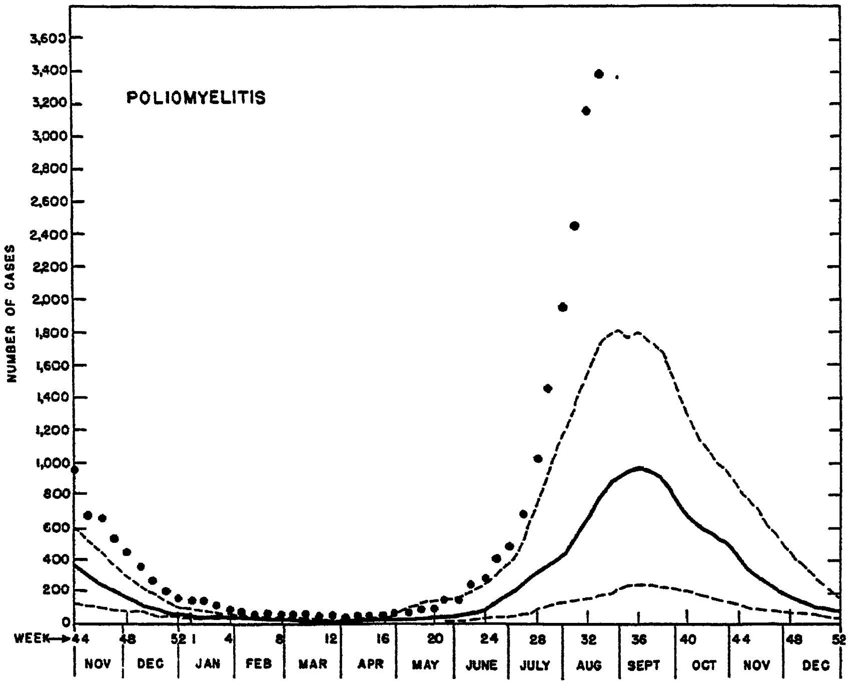
Division and State	Diphtheria	Encephalitis	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [c]	Whooping cough	Rabies in animals
NEW ENGLAND STATES														
Maine	----	----	----	2	----	----	40	----	----	----	----	----	6	----
New Hampshire	----	----	----	----	----	----	15	----	----	----	----	----	----	----
Vermont	----	----	----	2	----	1	[1] 16	----	1	----	----	----	14	----
Massachusetts	6	----	----	20	1	----	189	----	10	----	----	----	111	----
Rhode Island	----	----	----	1	----	1	14	----	----	----	----	----	8	----
Connecticut	----	----	2	26	----	22	39	----	2	----	----	----	62	----
MIDDLE ATLANTIC STATES														
New York	1	----	(e)	111	1	111	601	----	[d] 20	----	----	2	206	14
New Jersey	2	2	5	52	----	[1] 21	120	1	4	----	----	4	62	----
Pennsylvania	----	1	(e)	35	9	----	69	1	3	----	----	11	115	1
EAST NORTH CENTRAL STATES														
Ohio	2	----	1	36	2	48	200	----	10	----	----	12	63	6
Indiana	5	----	----	13	----	7	70	----	3	----	----	----	26	24
Illinois	----	1	2	48	3	49	348	----	5	----	----	6	98	1
Michigan [a]	7	----	----	77	2	35	[1] 320	----	15	----	----	1	115	1
Wisconsin	----	----	6	50	----	7	78	----	3	----	----	1	82	----
WEST NORTH CENTRAL STATES														
Minnesota	----	----	----	2	----	----	136	----	1	----	----	1	----	----
Iowa	1	----	----	10	----	----	114	----	----	----	----	----	3	3
Missouri	----	----	1	2	----	11	103	----	3	----	2	2	3	----
North Dakota	----	6	12	16	2	----	52	----	----	----	----	----	1	----
South Dakota	----	1	----	4	----	----	25	----	1	----	----	3	1	----
Nebraska	3	----	4	2	----	2	41	----	27	----	----	----	1	----
Kansas	----	----	1	1	----	9	55	----	5	----	----	----	4	----
SOUTH ATLANTIC STATES														
Delaware	----	----	----	----	----	----	7	1	----	----	----	1	8	----
Maryland [a]	3	----	----	6	1	33	10	6	2	----	1	----	29	----
District of Columbia	1	----	----	3	----	23	9	----	----	----	----	1	4	----
Virginia	----	----	105	16	4	30	21	4	5	----	2	4	19	1
West Virginia	1	----	18	13	----	2	29	1	5	----	----	2	8	----
North Carolina	6	----	----	11	----	----	14	8	9	----	1	1	19	----
South Carolina	2	----	2	5	----	8	2	----	----	----	1	2	1	4
Georgia	3	----	6	6	2	10	5	1	2	----	2	7	3	5
Florida	3	----	4	16	----	12	11	----	1	----	----	1	2	1

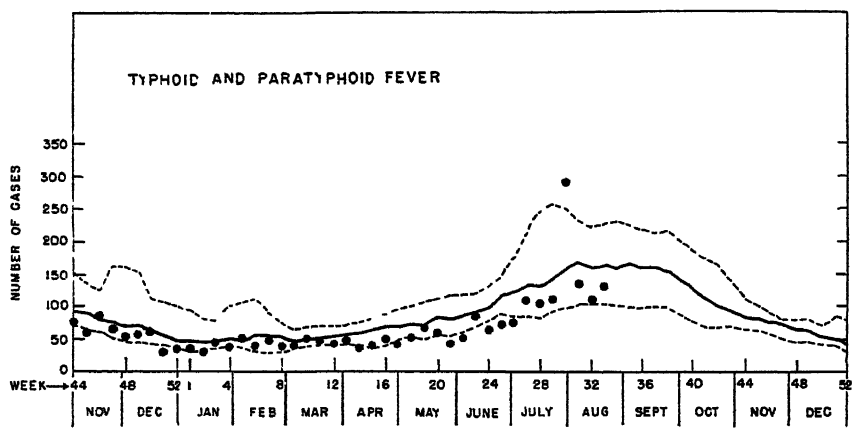
EAST SOUTH CENTRAL STATES														
Kentucky	1				3	1	42		8	1		4	5	18
Tennessee	8	1	13	15	2	29	41	1	14		1	12	41	
Alabama	4		4	6	1	14	[1] 6	1	4			3	10	2
Mississippi [a]	10		1			17	18		2			3	3	
WEST SOUTH CENTRAL STATES														
Arkansas	2		13	2	1	18	54		2		2	3	23	
Louisiana			2	5	2	11	6		2			6		1
Oklahoma			3	3		7	71		2		2	5	8	2
Texas	23	2	383	83	3	189	104		6		1	18	90	7
MOUNTAIN STATES														
Montana				18			2					2		
Idaho			14	20			33		d 10			2	4	
Wyoming	1			1		2	14							
Colorado	1		6	9	2	9	60		6			1	6	
New Mexico	1			4		4	7		4			2	4	
Arizona	1		15	2	1	4	20						11	
Utah [a]				17		2	11	3			3		21	
Nevada														
PACIFIC STATES														
Washington	1			38			29		10				15	
Oregon			1	23		7	7		4				27	
California	5		3	66	2	22	115		d 16			9	106	3
Total	104	14	627	854	44	781	3,420	28	227	1	18	132	1,478	
Median, 1944–48	203	19	561	814	59		1,254	25	544	1	17	131	2,045	
Year to dates 33 weeks	4,336	379	77,540	587,334	2,342	55,724	[1] 17,304	441	58,487	41	799	2,290	38,188	
Median, 1944–48	7,088	328	191,822	519,351	4,457		6,262	398	80,839	265	629	2,519	64,543	
Seasonal low week ends	(27th) July 9		(30th) July 30	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32nd) Aug. 13	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	568		1,673	639,727	3,186		[1] 16,388		227	51		1,830	48,221	
Median, 1943–48 [b]	1,067		1,625	584,297	5,961		5,999		544	348		2,041	91,908	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for diphtheria, influenza, poliomyelitis, scarlet fever, and typhoid fever the corresponding periods are 1944–45 to 1948–49.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately as follows: Ohio 2, Illinois 1, South Dakota 1, Florida 1, Tennessee 1, Texas 2, Colorado 1, California 5. Cases reported as salmonella infection, not included in the table, were as follows: New York 3.
[1] Corrections, poliomyelitis, cases.—Michigan, weeks ended: *Additions*—July 2, 2; *deductions*—Jan. 8, 1; Jan. 22, 4; Jan. 29, 1; Feb. 19, 1; Apr. 16, 1; July 9, 1; July 30, 3; Aug. 6, 1. Vermont, *deductions*—July 23, 1. Alabama, *deductions*—(not allocated to specific weeks), 4.
Alaska: Influenza 1, pneumonia 2, streptococcal throat 1.
Hawaii Territory: Measles 4.

Communicable Disease Charts

All reporting States, November 1948 through August 20, 1949





The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is the median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1948.

PLAGUE IN NEW MEXICO

Report on two cases of plague in New Mexico in July

The following information on the two cases of plague reported in New Mexico in July has been furnished by Mr. Justin M. Andrews, Scientist Director, Public Health Service.

One case occurred in a 10-year-old boy, living in Cerro, Taos County, with onset on July 29, a few days after he and his brother had killed a prairie dog. The patient became very ill, with a temperature of 106° F., but recovered under treatment with streptomycin and sulfadiazine.

The other case was in a 37-year-old male farmer, living in Placitas, near Bernalillo, Sandoval County, with onset on July 16. The patient had killed some gophers 2 or 3 days before being taken ill. He had a pneumonic involvement and raised considerable pus and mucus, but as no organisms were recovered and there were no contact cases, this condition may have been only an intercurrent infection. On August 11 the patient was stated to be recovering. He was treated with penicillin and aureomycin.

The diagnosis in both cases was confirmed in the State Health Laboratory. Typical organisms were reported to have been cultured from specimens from both patients.

In both cases the patient had been in contact with wild rodents, and there was no evidence of domestic rodents near the localities where the infection was acquired. Plague infection was reported in fleas from prairie dogs in Taos County in April 1949 and in Sandoval County in June, and also in the latter county the infection was found in fleas from grasshopper mice in May 1943.

PLAGUE INFECTION IN BERNALILLO COUNTY, N. MEX.

Under date of August 19, plague infection was reported proved in a pool of 2 fleas from 11 white-footed mice, *Peromyscus truei*, trapped August 4 at a location 4 miles east of Tijeras, Bernalillo County, N. Mex., on U. S. Highway 66, thence 1 mile north on old highway.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague infection in fleas.—Under date of August 18, 1949, plague infection was reported proved on August 11, 1949, in 31 fleas collected from 76 rats (9 *Rattus alexandrinus*, 4 *Rattus norvegicus*, 26 *Rattus hawaiiensis*, and 37 *Mus musculus*), trapped July 26, in District 1A, in the Kukuihaele area of Hamakua District, Island of Hawaii, T. H.,

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended July 30, 1949.—During the week ended July 30, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		16		40	77	8	34	31	32	238
Diphtheria				5		1			1	7
Dysentery, bacillary				3	1	1				5
Encephalitis, infectious					1		1			2
German measles		3		4	4		21	27	1	60
Influenza					4	3				7
Measles		16	2	108	96	36	82	73	93	506
Meningitis, meningococcal					1					1
Mumps		12		10	70	5	3	6	13	119
Poliomyelitis		2		61	102	1	6	5	15	195
Scarlet fever		1	1	18	11	2	1	3	3	40
Tuberculosis (all forms)		5	30	96	20	23	12	4	26	216
Typhoid and paratyphoid fever			1	15	6					22
Undulant fever				1	1			1		3
Venereal diseases:										
Gonorrhea		15	11	155	51	45	10	40	64	391
Syphilis		14	2	38	32	10		6	11	113
Whooping cough		1		88	40	1	3	2	1	136

Newfoundland cases: Chickenpox 2; diphtheria 1; measles 1; tuberculosis (pulmonary) 18; gonorrhea 3; syphilis 2.

Ontario Province and Toronto City—Poliomyelitis.—Information dated August 8, 1949, states that the incidence of poliomyelitis in the Province of Ontario and the city of Toronto to that date had been almost three times that for the comparable period of 1948. From January 1 to August 8, 1949, 277 cases had been reported in the Province, as compared with 97 cases reported for the same period in 1948. In the city of Toronto 172 cases were reported during the period. Of these 69 were residents of the city, 103 nonresidents sent to Toronto for treatment. There were no deaths among the resident cases, but 12 of the nonresident cases were fatal.

JAMAICA

Notifiable diseases—5 weeks ended July 30, 1949.—For the 5 weeks ended July 30, 1949, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Puerperal sepsis		1
Chickenpox	3	11	Tuberculosis (pulmonary)	37	56
Diphtheria	4	2	Typhoid fever	5	57
Erysipelas		1	Typhus fever (murine)	4	2
Leprosy	1				

MADAGASCAR

Notifiable diseases—June 1949.—Notifiable diseases were reported in Madagascar and Comoro Islands during June 1949, as follows:

Disease	June 1949			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi			1	0
Bilharziasis			56	0
Cerebrospinal meningitis	1	1	6	2
Diphtheria			2	0
Dysentery:				
Amebic	3	0	182	7
Bacillary			2	0
Erysipelas			15	1
Influenza	60	0	3,632	52
Leprosy			29	1
Malaria	390	1	38,427	245
Measles	11	0	121	2
Mumps	2	0	147	0
Plague			2	1
Pneumonia, broncho	2	0	280	50
Pneumonia, pneumococcic	2	1	342	44
Puerperal infection			4	1
Tuberculosis, pulmonary	2	0	96	22
Typhoid fever	1	1	16	3
Whooping cough			305	12

NEW ZEALAND

Notifiable diseases—4 weeks ended June 25, 1949.—During the 4 weeks ended June 25, 1949, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	6		Poliomyelitis	14	
Diphtheria	8		Puerperal fever	5	
Dysentery:			Scarlet fever	81	
Amebic	3		Tetanus	1	1
Bacillary	4		Tuberculosis (all forms)	149	36
Erysipelas	14		Typhoid fever	3	
Food poisoning	3		Undulant fever	2	
Malaria	1				

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

PLAGUE

Union of South Africa—Cape Province.—Plague has been reported in Kuruman District, Cape Province, Union of South Africa, as follows: Week ended July 30, 1949, present at Tierkolf and Saltrim Farms;

week ended August 6, 1 case at Tsinen Native Reserve, and 1 case at Caledonia Farm.

SMALLPOX

Netherlands Indies—Java—Batavia and Cheribon.—During the week ended August 6, 1949, 102 cases of smallpox were reported in Cheribon, Java, and for the week ended August 13, 415 cases were reported in Batavia.

YELLOW FEVER

Gold Coast.—Yellow fever has been reported in the Oda area of the Gold Coast as follows: On July 30, 1949, 1 case at Esuboni; on August 2, 1 case at Bawdua; on August 7, 1 case at Akwatia.

The 2 suspected cases of yellow fever reported in Gold Coast on July 21, 1949 (1 case at Akwatia, 1 case at Bawdua—see PUBLIC HEALTH REPORTS for August 19, 1949, p. 1,058) are stated to have been proved positive. Also the 2 fatal suspected cases reported July 20, 1949, at Nyakrom have been confirmed pathologically. (See PUBLIC HEALTH REPORTS for August 26, 1949, p. 1096.)

DEATHS DURING WEEK ENDED AUG. 13, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Aug. 13, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,813	7,934
Median for 3 prior years	7,934	
Total deaths, first 32 weeks of year	299,285	299,865
Deaths under 1 year of age	741	619
Median for 3 prior years	686	
Deaths under 1 year of age, first 32 weeks of year	20,910	21,507
Data from industrial insurance companies:		
Policies in force	70,253,019	70,956,591
Number of death claims	11,175	11,885
Death claims for 1,000 policies in force, annual rate	8.3	8.8
Death claims per 1,000 policies, first 32 weeks of year, annual rate	9.4	9.7

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 **SEPTEMBER 16, 1949** NUMBER 37

IN THIS ISSUE

A State Cancer Control Program

Nomenclature of Strains of *C. Diphtheriae*

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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CONTENTS

	Page
Proposed elements of a State cancer control program. Raymond F. Kaiser	1169
Nomenclature of strains of *C. diphtheriae*. K. I. Johnstone and J. W. McLeod	1181
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended August 27, 1949	1188
Foreign reports:	
British Guiana—Measles	1191
Canada—Provinces—Notifiable diseases—Week ended August 6, 1949	1191
Egypt—El-Kantara—Typhoid fever	1191
Finland—Notifiable diseases—June 1949	1192
Japan—Notifiable diseases—5 weeks ended July 30, 1949, and accumulated totals for the year to date	1192
Norway—Notifiable diseases—May 1949	1192
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Cholera	1193
Plague	1193
Smallpox	1193
Typhus fever	1193
Yellow fever	1193
Deaths during week ended August 20, 1949	1194

Public Health Reports

Vol. 64 • SEPTEMBER 16, 1949 • *No. 37*

Proposed Elements of a State Cancer Control Program

By Raymond F. Kaiser, M. D.*

Today the most baffling public health problems are related to the so-called degenerative diseases, those noncommunicable conditions which afflict most frequently the adult, especially the middle-aged. State health agencies throughout the country have recognized the significance of these problems and their activities are being correspondingly broadened. National concern about this type of disease led first to passage of the National Cancer Institute Act in 1937, with provisions for aid to State cancer control efforts, and more recently to Federal legislation in the fields of heart disease, dental, and mental health.

Cancer control, the first of these disease problems to receive widespread public health consideration, has developed rapidly. By constantly improving our programs, the United States can go far in reducing the mortality from this disease. Furthermore, cancer control methods may well provide a pattern for use in control of the other widely prevalent noncommunicable diseases. Briefly outlined are a number of activities which have been found useful in cancer control work, and which are suitable for State programs.

State Activities Today

In 1942 only 10 States had active cancer control programs. By 1949, the number of official programs was up to 48, plus 4 in the Territories. This change has come as a result of increased nation-wide awareness of the rising cancer problem and the availability of funds for cancer control purposes through the National Cancer Institute. Although well-rounded programs have not yet been established in all States, public concern with cancer is growing and these State activities will assuredly continue to expand in scope and effectiveness.

As of December 1948, 17 States had enacted laws for a permanent cancer program: 12 provide for cancer control work in the State

*Assistant Chief, Cancer Control Branch, National Cancer Institute.

health department; 4 provide for a State Cancer Commission; and one provides for cancer activities at a State University. In addition, 8 States included cancer control funds as part of their general appropriations, while 9 others provided for case reporting or other types of activity. Although the passage of permanent cancer legislation probably has a stabilizing effect and tends to assure program continuity, the lack of such legislation has not seriously hampered the establishment of cancer control activities. Several States have developed highly successful programs under the general authority vested in the State health department.

A wide diversity is found in State cancer control activities. This situation is certainly desirable in a Nation whose States are so different economically, physically, socially, and culturally. Although the basic principles of cancer control are the same for all and are determined by the development of medical science, each State program must be designed to fit local needs and resources.[1]

Cancer Control Funds

At present levels of public health expenditures and considering current needs, a State may reasonably expect to spend 10 to 20 cents per capita annually for cancer control. Within these limits, depending on the prevalence of cancer in the State and on available medical-care resources, it should be possible to organize a well-rounded program.

Cancer activities are not, of course, limited by available State appropriations. Voluntary contributions to the American Cancer Society, resources of medical institutions and efforts by local communities will also aid cancer control. Since 1947, the Federal Government, through the National Cancer Institute, has allotted annually \$2½ million among the States on a formula basis, with the provision that the recipient State match one dollar for every two Federal dollars. Under this grant-in-aid plan, individual States received from \$4,606 to \$215,276 in 1949. These funds may be used for any of a large number of types of cancer activities, as well as for certain administrative expenses necessary to the cancer program.[2]

Special control project grants are made by the National Cancer

[1] A. V. Deibert: A half century of State cancer legislation. Pub. Health Rep. 63: 1128–1135 (1948).

[2] Federal cancer control grants may be used for the following administrative expenses:

(a) Direct cost of the cancer control program, including administrative and generalized services to the extent that such services support the control program.

(b) Necessary supplies, equipment, and other expenses incident to the control program.

(c) Salaries, fees, and travel of personnel exclusively administering the program or providing direct services to individuals under the program.

Without special approval, these Federal grant funds may not be used for other administrative expenses, nor for building construction, hospitalization (longer than 3 days for diagnostic purposes), transportation of patients, palliative or terminal care, or certain other purposes as specified in Public Health Service Regulations. (Grants-in-Aid Manual, Bureau of State Services, 13–3, Sec. 11.)

Institute to States, local health agencies, hospitals, universities, and other nonprofit institutions for the development of cancer control methods and services. In 1949, $1 million was available for such grants. In addition, the National Cancer Institute makes available amounts up to $25,000 to medical schools and up to $5,000 to dental schools for improvement of undergraduate cancer teaching. A limited number of National Cancer Institute traineeships assist qualified physicians in taking advanced clinical work in cancer fields.

A State Cancer Program

Successful cancer treatment, in our present state of medical knowledge, depends on early case finding, accurate diagnosis, and prompt treatment. State programs, therefore, must be directed toward development of lay and professional information programs and assurance of the strategic distribution of adequate cancer services and facilities.

Because of its scope and complexity, solution of the cancer problem cannot be the sole responsibility of official health agencies. In some areas, in fact, medical societies and voluntary groups took the lead in initiating cancer activities long before any State or local official action was begun. Among those concerned with various aspects of cancer control are the general practitioner; specialists such as the pathologist, radiologist, surgeon, and internist; medical societies; divisions of the American Cancer Society; medical, dental, and nursing schools; hospitals providing cancer services; research centers; and welfare agencies.

None of these groups or individuals, working alone, can hope to make any appreciable headway against the disease. Only by pooling resources and establishing efficient working relationships can cancer control progress be achieved. Essentially the role of the State health agency is to provide leadership in bringing these forces together and contributing what it can through use of available public funds and personnel.

Cancer Coordinating Committee

Recognizing this need for broad participation and combined effort, many States are forming cancer coordinating committees to help plan and guide all cancer work within the State. These committees usually include representatives of the State health department, State medical society, and State division of the American Cancer Society. They might also include representatives of medical specialty groups, dental society, nurses' organizations, medical educators, welfare agencies, and others concerned with cancer. It is important that the committee include representatives of all major agencies concerned with the disease.

The first task of such a committee should be to study the cancer problem in the State, make policies, and develop a plan for making the best possible use of available resources. This means, of course,

that the committee will define the responsibilities and functions of each organization. It also means that the various agencies shall be willing to accept committee leadership.

No attempt is made to indicate which individuals or groups should carry out the particular types of projects in the various activities listed below. However, emphasis has been placed on projects that might most suitably be carried out by the State health department or made possible by assistance from that department. Furthermore, the order in which these suggestions are made is highly arbitrary, and does not represent a sequence of steps which should be taken to achieve a balanced program. These activities are merely presented as individual suggestions which have been successfully used or are being tested in various places and which might be fitted into a well-rounded State program.

Professional Education

Professional education is an essential part of any State cancer control program. Cancer control depends on a well-informed professional group, including not only the family physician and the medical specialist, but also the dentist, the nurse, the pharmacist, and members of the public health staff. All of these individuals should be intelligently "cancer conscious," and know how they can aid in earlier case finding and help in the management of cancer cases.

Medical Practitioners

The alertness, skill, and knowledge of the medical practitioner is the pivot of the cancer program. There is an urgent need to increase cancer awareness of the entire medical profession, to teach them how to recognize early cancer cases, and to keep them informed on recent developments in prevention, diagnosis, and treatment. Working with the medical groups, the State health department can:

1. Prepare and distribute a monthly bulletin giving reviews of cancer subjects and abstracts of current cancer literature. (Examples: Illinois Cancer Bulletin, Texas Cancer Bulletin.)
2. Prepare and distribute a manual for physicians on cancer case finding, diagnosis, and treatment. (Example: Iowa Cancer Manual, Massachusetts Cancer Manual.)
3. Encourage regular publication of cancer papers in medical journals.
4. Encourage presentation of cancer papers at State and county medical society meetings.
5. Prepare or purchase visual aids for circulation among local medical groups, including photographic slides showing early cancer lesions, tissue section slides, cancer teaching films, and exhibits.
6. Help organize and support cancer refresher courses for practicing physicians at medical teaching centers.

7. Aid the organization of and provide support for short regional cancer conferences or seminars.
8. Help organize and support program of circuit cancer clinics, bringing outstanding cancer workers into all parts of the State to demonstrate diagnostic methods.
9. Encourage postgraduate study and attendance at cancer refresher courses by paying tuition, fees, or travel expenses.

Undergraduate Medical Students

Every medical undergraduate must have the opportunity to acquire a sound basic understanding of cancer and to become well acquainted with suspicious signs and symptoms through clinical observation. To help coordinate cancer teaching for undergraduates, the National Cancer Institute makes annual grants up to $25,000 to medical schools. This aid can be supplemented from sources within the State.

1. Provide funds for purchase or preparation by medical schools of visual teaching aids, including films, photographic slides, and tissue slides.
2. Provide funds for equipping and expanding cancer teaching clinics.
3. Increase understanding of cancer as a public health problem by providing lectures on cancer control by public health personnel and providing opportunities for students to receive training in the health department.

Graduate Medical Students

Proper management of cancer requires the services of many types of qualified physicians, including pathologists, radiologists, surgeons, and internists. Through the National Cancer Institute and the American Cancer Society, a limited number of clinical traineeships are available for physicians interested in obtaining additional knowledge and experience in cancer care. Further assistance can be given through State appropriations and allotted Federal funds to increase the supply of physicians qualified to care for cancer patients.

1. Establish fellowships in pathology, radiology, surgery, and internal medicine.
2. Encourage and, where possible, help hospitals improve their staffs and facilities in order to provide more opportunities for approved interne and resident training in cancer.

Dental Practitioners

A high proportion of skin and oral cancer lesions may readily be observed by the dentists. It is important that the dentist recognize suspicious conditions and help obtain proper care for the patient.

Working with the dental groups, the State health department can:

1. Encourage dental societies to present cancer subjects at their meetings.
2. Prepare or purchase visual aids for circulation to local dental meetings, including photographic slides showing early cancer lesions, teaching films, and exhibits.
3. Help organize and support short cancer courses at dental teaching centers.
4. Help organize and support cancer symposia and conferences in various parts of the State.
5. Assist in the organization and support of traveling teams to acquaint dentists in all parts of the State with cancer recognition.

Dental Students

Cancer teaching in dental schools, as in medical schools, is aided through annual National Cancer Institute grants. These Federal grants are limited to $5,000 annually, but further aid for improved cancer teaching may be provided by the State.

1. Provide funds for purchase or preparation of visual teaching materials, including films, slides, and moulages.
2. Provide funds for equipping and expanding cancer clinics where dental students may observe diagnostic and treatment methods.
3. Increase the understanding of cancer as a public health problem by providing lectures to dental students on cancer control by public health personnel and opportunities for undergraduates to receive training in the health department.

Nurses

Nurses require a thorough understanding of the special needs of the cancer patient and the special techniques necessary for proper bedside care. The public health nurse should not only understand these care needs but should also be equipped to play a very important part in case finding, referral, follow-up, and dealing with psychological, socio-economic, and rehabilitation problems. The State health department can aid this education in many ways.

1. Provide courses and in-service training in cancer care and cancer control methods for public health nurses.
2. Prepare or purchase visual teaching materials for circulation to nursing groups, including slides, films, and exhibits.
3. Provide manuals on cancer nursing for clinical and public health nurses.
4. Help schools of nursing properly integrate cancer teaching into undergraduate curricula.

5. Sponsor medical lectures providing useful and up-to-date cancer information for nurses.
6. Help organize and support cancer nursing institutes for hospital nurses.
7. Establish scholarships for postgraduate cancer nursing education.

Public Health Staff

Since cancer has only recently been considered a public health problem, relatively few public health workers are familiar with control methods. Not only physicians and nurses, but also health educators, medical social workers, statisticians, and medical record librarians and other public health personnel should be familiar with the cancer problem.

1. Provide orientation courses for all public health personnel, and special instruction for staff members concerned with specific phases of the program.
2. Encourage study at schools of public health through scholarships, fellowships and leaves of absence. (The Yale and Harvard Schools of Public Health now offer cancer control courses for regular and special students.)

Pharmacists

Many persons go to the pharmacist for advice on chronic ailments which seem minor but which may possibly indicate cancer. The well-informed, alert pharmacist, therefore, is potentially an important cancer case finder. During the past year a joint National Cancer Institute-American Pharmaceutical Association project has been providing pharmacists with cancer information through pharmaceutical journals and by means of direct mailings. This education work should be supplemented and continued by efforts within the State.

1. Provide lecturers on cancer control for senior classes at schools of pharmacy.
2. Help provide opportunities for cancer clinic observation of selected cases by senior pharmacy students.
3. Prepare and distribute information materials acquainting pharmacists with common cancer signs and urging them to refer the customer to his family physician or a cancer clinic.

Lay Education

Lay cancer education teaches three things: Know possible cancer symptoms—seek medical attention promptly—obtain periodic medical examinations.

In many States, the American Cancer Society has assumed a leading role in lay education. In these cases, it will be desirable for the

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official health agency to work in close cooperation with this voluntary group and to supplement its efforts.

1. Prepare and distribute accurate, clear cancer information through such media as pamphlets, press releases, posters, radio broadcasts, periodicals, and exhibits.
2. Maintain a lending library of cancer films suitable for lay audiences.
3. Provide information on cancer control facilities and services, including lists of cancer clinics and detection centers, physicians who will provide complete health examinations, and physicians who provide cancer diagnostic and treatment services.
4. Sponsor a speakers' service which will maintain a list of available speakers; prepare speech outlines and other materials that may be useful in planning talks for lay groups; provide honoraria for medical speakers; and encourage civic groups, fraternal organizations, church groups, labor unions, and others to plan cancer talks for their members.
5. Assist in the organization of lay cancer education committees in local communities. (Example: Cooperative Cancer Control Committees in Massachusetts.)
6. Help plan lay cancer education programs in hospitals and health centers.
7. Instruct public health nursing staff in lay education methods, including instruction during home visits and talks before lay groups.
8. Develop special cancer education programs for various groups such as labor union memberships, factory workers, office workers, rural families, foreign language groups, and others.
9. Introduce cancer education into school curricula at secondary levels in order to instill in young people sensible attitudes toward cancer hygiene, combat the formation of fears, and give them a sound understanding of the disease. This may be done through teacher instruction in teachers' colleges; provision of teaching guides, films, and texts; and modification of school curricula to introduce discussion of cancer at appropriate places in biology, health education, and social studies classes.[3]

Case Registers and Statistical Services

A well-organized and effective system for the accumulation of information on cancer morbidity and mortality is needed in every State. Such data afford a basis for program planning and for the provision of nursing and follow-up services. Statistical analysis of case reports may reveal epidemiologic factors, provide a yardstick of

[3] Statement of principles as a guide for cancer education in the schools. American Cancer Society, March 1949.

the need for cancer services and facilities, and measure the effectiveness of the cancer program.

1. Develop and maintain an active cancer register system which will be useful in cancer programs at both State and local levels.
2. Develop and help introduce a system for referral and follow-up services, provided on the local level, to assure adequate supervision of all reported cancer cases as an aid to hospitals, clinics, and physicians.
3. Provide advisory service to clinics and hospitals on use of cancer case records.
4. Make epidemiologic studies using material from the cancer case register, hospital records, or sample surveys.
5. Develop indexes of the effectiveness of cancer control work such as studies of survival rates, delays in obtaining diagnosis and treatment, need for hospital and nursing services.
6. Provide advisory service to physicians and clinic groups on statistical analysis and interpretation of case records.
7. Prepare statistical materials in the form of charts, articles, slides and exhibits to be used in lay and professional information work.

Cancer Prevention Services

Exposure to carcinogenic agents is known to occur in a number of industries and occupations, resulting in a higher than normal incidence of certain types of cancer among persons employed in these locations or tasks. Misuse of carcinogenic agents such as X-ray and hormones for therapeutic or cosmetic purposes may also constitute a cancer hazard. Working with the industrial hygiene agency, the State cancer control program should enter into this field and introduce such feasible protective measures as are needed.

1. Survey industries, occupations, and other environmental factors for known carcinogenic agents.
2. Apply corrective measures through appropriate education, physical protection, medical services, legislation, regulation, and enforcement.
3. Study occupational histories of cancer cases to determine other possible environmental factors.

Case Finding Services

At the present time, alertness to cancer signs and periodic physical examinations are recognized as the most effective and most widely applicable case-finding methods. New case-finding tests and techniques should be introduced as rapidly as their value can be proved. The State can promote early case finding in many ways.

1. Prepare and distribute to physicians a pamphlet giving indications of cancer and outlining an adequate physical examination procedure.
2. Prepare and distribute to physicians physical examination forms that will help insure more thorough performance of periodic check-ups.
3. Explore the feasibility of encouraging the practice of health examinations through subsidization of diagnostic laboratory services given as part of such examinations by private physicians.
4. Train technicians and pathologists in screening and interpretation of cytologic slides.
5. Distribute information on the cytologic test to physicians, together with equipment for taking specimens and mailing tubes or envelopes.
6. Add cancer case-finding procedures to examinations at various public health clinics, including maternal and child health, venereal disease, tuberculosis, public institutions, preplacement, etc.
7. Encourage the introduction of cancer case-finding procedures in private clinic, hospital, insurance, preplacement and other examinations.
8. Help organize and support cancer diagnostic cênters in communities where there is a demonstrated need for such services.
9. Sponsor or conduct research into possible new cancer case-finding tests and procedures.

Consultation Services

In many parts of the country, particularly in the rural areas, there is a dearth of qualified physicians who can advise on cancer management. Provision of consultant services to these areas will directly benefit the patient and will broaden the understanding and knowledge of the practitioner.

1. Help organize and support a system for providing consultant services to physicians in rural areas. (Example: Traveling team holding clinics for consultation purposes in rural areas.)
2. Encourage clinics and teaching centers to provide consultant services for physicians not on the staff.
3. Assist in the provision of consultant services to low income patients.

Tissue Diagnostic Services

Accurate diagnosis of cancer rests upon the microscopic examination of tissue by a pathologist. Histopathologic diagnosis should be encouraged for all suspected cancer cases where a biopsy can be taken.

1. Provide free or low cost tissue diagnostic service for low income patients through payments to private laboratories.
2. Aid the establishment of tissue diagnostic services in hospitals or medical centers by furnishing needed equipment, lending personnel, or paying salaries.
3. Prepare and distribute to physicians a pamphlet on indications for biopsy, biopsy technique, and its role in diagnosis.
4. Encourage the practice of biopsy by providing physicians with proper forceps and mailing tubes.
5. Help develop and support a tumor register for use in study and teaching.
6. Establish or support a tissue slide loan service for pathologists.

Clinic Services

Many successful cancer clinics in public and private institutions have been established as community projects and are partly or completely financed by civic groups or official health agencies. Such organizations, well staffed and properly equipped, are one of the most important cancer services.

1. Encourage hospitals to establish clinics in accordance with the recommendations of the American College of Surgeons.
2. Assist in the establishment, maintenance, and operation of clinics.
3. Help support cancer clinics through payment of fees for services to low income patients.

Hospital Services

The management of cancer requires hospitalization in most cases, if only for diagnostic purposes. A shortage of beds has often hampered prompt diagnosis and has also been an important factor in delaying treatment. This situation may be alleviated by various means such as hospital priorities for diagnosis and early treatment and providing long-term care outside the hospital wherever possible.

1. Encourage hospitals to make beds available for short periods for diagnosis and for prompt cancer treatment.
2. Pay for short-term hospitalization of low income patients for diagnostic purposes. (Use of Federal grant funds is permitted for up to 3 days' hospitalization for diagnostic purposes.)
3. Encourage hospitals to provide cancer nursing instruction and rehabilitation programs through loan of personnel, training programs, payment of salaries for instructors, and purchase of equipment.
4. Assist and encourage hospitals in the development of home care programs to reduce the demand for hospital beds by chronic cases. (Example: Montefiore home care plan.)

5. Assure adequate space and facilities for cancer clinic and facilities in hospitals constructed with Federal aid provided by the Hill-Burton Act.
6. Encourage the development of more and better nursing homes and long-term care institutions through licensing provisions and other means.

Public Health Nursing Services

The public health nursing staff is used in cancer case finding, referral, follow-up, home care and coordination of social welfare services. The State health department can:

1. Develop a public health nursing program for home care of cancer patients.
2. Develop a referral and follow-up system, using case report files as a base, to be carried out at the local level.
3. Develop a program for coordination of nursing, social welfare, and mental hygiene services for cancer patients and their families.
4. Develop a rehabilitation program for convalescent cancer patients, providing for prosthetic devices, instruction in their use, mental hygiene services, retraining, and vocational readjustment.

Program Planning and Evaluation

In the State health department, careful preliminary planning is necessary to assure best use of available resources. There is a great need for trying out and developing new control methods. Continuous evaluation of projects and methods is needed to find out whether the control activities are well run and serving a useful purpose. Furthermore, leadership by the State health department means that this department, through sponsorship of joint planning efforts, advisory services, financial assistance and demonstrations, shall encourage local agencies and nonofficial groups to take increasingly active roles in cancer control.

1. Make a continuing survey of cancer control needs and resources as a basis for program planning, including extent of the State cancer problem; available facilities and services for case finding, diagnosis and care; the extent to which they are being used; and how they could be used more effectively.
2. Evaluate adequacy and effectiveness of individual cancer control projects, including lay and professional information programs, tissue diagnostic services, clinical and hospital facilities, nursing services, and social services.
3. Operate demonstration projects in order to develop various types of service; find out whether they are effective; and show local and

nonofficial agencies how such projects may be established and operated.

Cancer control, now a recognized public health program, offers specific action techniques. Like other public health programs. it must continually be cognizant of advances in medical science which may be applicable to solution of its problems, testing and evaluating new control methods and putting them into practice whenever their usefulness is demonstrated.

Vigorous leadership by the State health agency is needed to mobilize all cancer control resources for the most efficient and effective use in minimizing the cancer problem.

Nomenclature of Strains of *C. Diphtheriae*

By K. I. JOHNSTONE and J. W. MCLEOD*

One of the writers and his colleagues (*1*) have suggested a differentiation of three principal varieties in the cultural forms in which the bacillus of diphtheria is met. These forms have been described as the gravis, intermedius and mitis varieties of *C. diphtheriae*.

Although this nomenclature has been adopted by many observers, some have preferred to make similar differentiation through the use of numbers or letters in order to avoid names which they consider misleading in their implications, and others have preferred not to classify this organism in these forms (*11, 15*). Regardless of the merits or demerits of these differing nomenclatures, confusion may arise when new terms are introduced to describe forms which do not appear to differ sensibly from those already described under other names. The following observations on the strains of bacteria recently described in the United States under the name of *C. diphtheriae* type minimus are submitted for consideration.

The term *C. diphtheriae* minimus was used by Frobisher, Adams and Kuhns (*6*) and Eller and Frobisher (*5*) to describe a form they first noticed in a predominant role in an outbreak of diphtheria more severe than those previously experienced in the city of Baltimore.

This form of the diphtheria bacillus was peculiar in appearing as very fine colonies on the media used and also in fermenting glucose very slowly. Since the former character was a constant feature of all strains described in Europe as *C. diphtheriae* type intermedius, it seemed to us desirable to compare the Baltimore strains with intermedius strains which had been isolated in Europe.

*Reader in bacteriology, and Brotherton professor of bacteriology, respectively, University of Leeds, England.

Table 1. *Baltimore strains*

Dr. Frobisher's description and number	Appearance on blood agar tellurite medium	Fermentation	Appearance in nutrient broth	Appearance on heated blood agar+rabbit's serum	Morphology	Virulence	Classification
808 minimus	Fine, flat black colonies.	Glucose+, saccharose and starch−.	Fine granules tending to settle.	Green coloration	Markedly barred; metachromatic granules prominent.	Killed guinea pig within 30 hours.	Intermedius.
810 minimus	do	do	do	do	do	Not tested	Do.
832 minimus	do	do	As above, also a few flakes.	do	do	do	Do.
319, 405, 499, 502. Saccharose fermenting diphtheria bacilli virulent to guinea pigs.	Medium convex glossy and smooth as mitis.	Glucose and saccharose+, starch−.	Diffuse fairly copious turbidity.	Copious growth, no greenish color.	Not recorded	Killed guinea pig within 48 hrs.; characteristic lesions; control receiving antitoxin lived.	?

Table 2. *Utah strains*

Dr. Galbraith's number and classification	Appearance of colonies blood agar tellurite medium	Fermentation	Appearance nutrient broth	Appearance heated blood agar+rabbit's serum	Morphology	Virulence	Classification
Minimus (7 strains) 084, 144, 269, 272, 910, 935, 936.	Fine, flat or slightly convex black colonies.	Glucose+, sacch.+, starch−.	Deposit of fine flakes.	No green coloration	Fragmented forms often almost diplococcal.	3 were tested and failed to kill.	Diphtheroid.
Minimus (4 strains) 074, 601, 931, 983.	do	Glucose+, sacch.−, starch−.	do	do	Medium to long barred forms like intermedius.	2 were tested and failed to kill.	Do.
Minimus 790	do	Glucose−, sacch.−, starch−.	Partly floccular sediment.	do	Fragmented forms often almost diplococcal.	Failed to kill	Do.
Gravis 368	Large, flat, black with radiating striation.	Glucose+, sacch.−, starch+.	Pellicle; heavy deposit of flakes and granules.	No green coloration	Not recorded	Killed guinea pig within 30 hrs.	Gravis.
Saccharose fermenters (3 strains) 77, 173, 787.	Large, smooth glossy black colonies.	Glucose+, sacch.−, starch−.	Pellicle and copious deposit with diffuse turbidity.	No green coloration	Long beaded forms	77 and 173 killed guinea pig within 48 hrs. 787 not tested.	Mitis.

Dr. Frobisher very readily put a number of these strains at our disposal as well as some others which were peculiar in fermenting saccharose but otherwise resembled *C. diphtheriae* type mitis and were virulent to guinea pigs.

Several years later, Galbraith, Fraser and Bramhall (*7*) described the appearance of minimus strains in association with diphtheria in Utah. Dr. Galbraith also kindly supplied a collection of these strains.

The features emphasized as characteristic of intermedius strains are: a fine, flat, black colony with or without a small central papilla on blood tellurite agar; a very finely granular turbidity in meat extract broth which tends to settle as a fine deposit leaving the remaining liquid clear and supernatant with no pellicle; a marked tendency to barred morphology; the production of a greenish color in heated blood agar media reinforced with 10 percent of fresh rabbit's serum (*9*); fermentation of glucose but of neither starch nor saccharose, and failure to produce hemolysis.

Tables 1 and 2 record the findings with respect to these characters for the strains received from the United States.

From these observations the following conclusions are drawn: The strains described by Frobisher as minimus are not easily distinguished from those which have been described in this country and in several others in western Europe as intermedius. The only point of divergence, which we observed, was a greater tendency in the Baltimore strains to show metachromatic granules in preparation from heated blood agar stained with Loeffler's alkaline methylene blue. The strains he described as virulent but fermenters of saccharose are apparently a variant which is either very rare in this country or has escaped observation. It was thought that these strains might be mitis strains with a very slight admixture of a saccharose fermenting diphtheroid but all our attempts to demonstrate such an admixture have failed. These attempts included the separation of four cultures grown from single cells by the method described by Goldie, Gordon and Johnstone (*8*). Each of these cultures was shown to ferment saccharose and to kill the guinea pig after producing characteristic lesions.

Frobisher's observation is obviously of great importance. The teaching that no true diphtheria strain ferments saccharose is so firmly established and based on so much careful observation (*2*), that most workers in this field have considered they were justified in discarding any strain under investigation as possible *C. diphtheriae* as soon as it proved to be a saccharose fermenter. It is possible that had all these discarded strains been investigated, a percentage of them like the Baltimore strains might have been shown to be pathogenic to guinea pigs, producing lesions characteristic of a diphtheria

Table 3

Standard appearances in recently isolated strains			Appearances on various media			Broth	Morphology	Sugars	Virulence for guinea pig*
			Heated blood tell. agar	Heated blood agar	Heated blood agar +serum				
Strain	Origin	Period elapsed since isolation	Fine, flat black colonies	Fine, flat uniform colonies	Fine, flat colonies with greenish color which disappears on 2d or 3d day as growth increases	Fine, granular turbidity tending to deposit	Barred forms predominant occasional clubbing	Gl. + S.— St.—	Positive
A. 8	Civilian in Graz, Austria.	3 years	0	0	Green color lost	0	0	0	Not done.
A.13	do	3 years	0	0	Green color lost	0	0	0	+30.
A.51	do	3 years	0	0	Green color lost	Some coarser floccules.	0	0	Not done.
A.80	do	3 years	0	0	Green color lost	0	0	0	Not done.
A.83	do	3 years	0	0	0	0	0	0	+<40.
16	B. A. O. R. troops in Austria.	3 years	0	Growth coarser	Green color lost	0	0	0	Not done.
23	do	3 years	0	Growth coarser	Green color lost	0	0	0	Not done.
B.22	Bergen, Norway	3 years	Growth coarser.	0	Green color lost	Considerable turbidity.	Barring not marked.	0	Not done.
O.11	Oslo, Norway	2½ years	Growth coarser	Growth coarser	Green color lost	Considerable turbidity.	Barring not marked.	0	Not done.
Ba.810	Baltimore minimus strain.	3 years	0	0	0	0	0	0	+<40.
Ba.832	do	3 years	0	0	0	0	0	0	Not done.
L/Aitken	Leeds, England	17 months	0	0	Green color lost	0	0	0	+45.
L/214	do	>7 years	0	0	0	0	0	0	+<40.
L/410	do	>7 years	0	0	0	0	0	0	+28.

0=no change.

*Haemolytic tests had not been done with all these strains when first isolated or received. They were done, however, at the same time as the other tests recorded in this table. All were entirely negative except for a trace of haemolysis with 0.11. Control observations with 2 mitis and 1 gravis strains gave frank haemolysis.

infection but completely innocuous in control guinea pigs which had received antitoxin.

Galbraith has shown that gravis strains similar to those so widespread in Europe are playing some part in diphtheria outbreaks in Utah. The strains he describes as minimus, however, do not correspond to the intermedius or any other form of *C. diphtheriae* encountered in Europe nor to Frobisher's minimus strains. In view of their failure to kill guinea pigs, great caution should be exercised in accepting them as diphtheria bacilli. A small percentage of nonvirulent strains has been found in all cultural varieties of the diphtheria bacillus, but, when uniformly avirulent varieties differing from all others previously recognized are described, an overwhelming case must be presented before they can be accepted.

Stability of Intermedius Strains in the Human Body

There is considerable presumptive evidence for the stability of the intermedius strains of *C. diphtheriae* in the human body.

In vivo. Their stability *in vivo* is shown in two ways. First, in large areas where different types are responsible for the diphtheria prevalent, it has been observed that the strains of intermedius are found to come from one or two of the communities within the area and from nowhere else, Grossmann (*10*). Second, observations on diphtheria in closed groups of the population have sometimes revealed outbreaks continuing over weeks or months in which only this type of bacterium has been recognized. McLeod, Orr, Woodcock (*12*) record an example in which 13 consecutive cases of diphtheria due to the intermedius strain were the only cases of diphtheria recorded in a school over a period of 6 months. Croll (*4*) also records a considerable outbreak in a Royal Air Force unit in which 26 cases and 5 carriers infected with the intermedius strain were recognized in the course of a month.

An interesting feature was that cases from the latter outbreak were all returned as intermedius infection although examined in separate laboratories. One of the laboratories was remote from the others and was quite unaware of the possible connection of the case under investigation with the outbreak; the swabs from the patient's throat were taken while she was on leave (incidentally this was the only fatal case among the 26).

In vitro. It has been shown from the careful investigations by Robinson (*13*) and others that, for a considerable period of time at all events, the intermedius strains show marked stability in subculture. There is no doubt, however, that some strains after long periods give coarser growth and lose their capacity to produce the characteristic greenish tint on heated blood agar. It is also noteworthy that in rare instances it has been possible to obtain strains resembling gravis strains

from those which originally showed in part, or altogether, the characters of intermedius strains (*13*, *3*, *14*, *8*). The work of Goldie et al. (*8*) was carried out by repeated single cell cultures to eliminate possible error due to work with mixed cultures.

In view of these findings, the extent of alteration in a collection of intermedius strains, in subculture for considerable and various periods of time and coming from widely separated areas, is recorded in table 3.

It is clear from these results that a considerable number of strains maintain their character intact over 3 or more years. The greatest number, however, lost the tendency to develop an olive green color on serum heated blood agar. A minority lost the metabolic peculiarity which checks their growth on most media.

In the recorded series these changes were most marked with the Norwegian strains.

Six of the strains were tested for virulence at the end of the period of preservation in culture and all proved fully virulent.

Conclusions

The strains received from Dr. Frobisher under the designation *C. diphtheriae* minimus are not easily distinguished from those previously described in Europe as intermedius. The strains recently described in Utah as *C. diphtheriae* type minimus do not correspond either to the Baltimore minimus or to the European intermedius and appear to be diphtheroid bacilli.

Among 14 intermedius strains collected in Europe and America and subcultured for 2½ to 7 years, 5 retained their original characters intact, 5 lost their capacity to produce an olive green color in serum heated blood agar media but showed no other change, and 4 were also producing coarser growths so that some of them approached mitis in type.

The strains Dr. Frobisher has described, which ferment saccharose but resemble *C. diphtheriae* in all other respects, retained their characters in subculture when examined in Leeds after a considerable interval of time, both directly [1] and after isolation of cultures from single cells. Their existence is a matter of importance and their distribution and significance should be further investigated.

ACKNOWLEDGMENT

We wish to express our indebtedness to R. Burrow for assistance in maintaining the strains in subculture and carrying out many of the observations described; also to the Medical Research Council for a grant-in-aid for the work.

[1] Cultures were examined as they were obtained from America without any attempt to make subcultures from separate colonies. One, or perhaps more, subculture would intervene, however, before the fermentation tests.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED AUGUST 27, 1949

A decline, the first since June 4, was reported during the week in the incidence of poliomyelitis. A total of 3,244 cases was reported, as compared with 3,420 last week (a 5-percent decrease), 1,412 for the corresponding week last year (which number was also the 5-year median), representing an increase of 7.5 percent. Currently, decreases were recorded in five of the nine geographic areas. The figures by geographic areas are as follows (last week's figures in parentheses): New England 365 (313), Middle Atlantic 760 (799), East North Central 818 (1,034), West North Central 592 (526), South Atlantic 123 (108), East South Central 95 (107), West South Central 191 (235), Mountain 136 (147), Pacific 164 (151). Of 43 States reporting more than 9 cases, 20 showed a combined decrease of 395 cases. Those reporting more than 19 cases each are as follows: *Increases*—Maine 44 (40), New Hampshire 32 (15), Massachusetts 194 (189), Connecticut 70 (39), Wisconsin 81 (78), Minnesota 183 (136), Iowa 134 (114), Missouri 116 (103), Nebraska 51 (41), Virginia 34 (21), Washington 48 (29); *decreases*—New York 573 (601), New Jersey 122 (129), Pennsylvania 65 (69), Ohio 123 (209), Indiana 58 (70), Illinois 276 (348), Michigan 282 (329), North Dakota 50 (52), Kansas 33 (55), Kentucky 33 (42), Tennessee 31 (41), Arkansas 50 (54), Oklahoma 62 (71), Texas 69 (104), Colorado 53 (60), California 101 (115); *no change*—South Dakota 25, Idaho 33. The total for the year to date is 20,543, same period last year 11,155, 5-year median 7,792.

During the week, California reported two cases of relapsing fever and 1 case of leprosy. Diagnosis was reported changed on 1 case of psittacosis reported in North Carolina for the week ended June 18.

Deaths recorded during the week in 93 large cities in the United States totaled 7,978, as compared with 8,454 last week, 8,669 and 8,327, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,327. The total to date is 313,132, as compared with 314,054 for the same period last year. Infant deaths totaled 643, last week 719, corresponding week last year 692, 3-year median 711. The cumulative figure is 21,988, same period last year 22,521.

Telegraphic case reports from State health officers for week ended Aug. 27, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	.....	.....	.....	1	.....	11	44	.....	2	.....	.....	.....	5	.....
New Hampshire	.....	.....	.....	.....	.....	.....	32	.....	.....	.....	.....	.....	9	.....
Vermont	.....	.....	.....	1	.....	.....	10	.....	1	.....	.....	.....	1	.....
Massachusetts	6	.....	.....	21	3	.....	194	.....	17	.....	.....	1	83	1
Rhode Island	.....	.....	.....	2	.....	6	15	.....	1	.....	.....	.....	2	.....
Connecticut	.....	.....	.....	8	.....	28	70	.....	2	.....	.....	.....	26	.....
MIDDLE ATLANTIC														
New York	6	1	(e)	70	4	110	573	2	d 20	.....	.....	7	104	13
New Jersey	.....	.....	2	25	2	50	122	.....	7	.....	.....	3	68	.....
Pennsylvania	1	1	(e)	36	2	.....	65	.....	7	.....	.....	6	114	.....
EAST NORTH CENTRAL														
Ohio	2	.....	.....	21	.....	35	123	.....	16	.....	.....	2	72	3
Indiana	23	1	3	13	1	25	58	.....	5	.....	.....	1	19	13
Illinois	1	2	3	33	2	79	276	3	11	.....	1	7	94	.....
Michigan [a]	2	1	1	58	.....	13	[3] 280	.....	12	.....	.....	1	105	4
Wisconsin	.....	.....	13	52	.....	2	81	.....	3	.....	.....	.....	77	.....
WEST NORTH CENTRAL														
Minnesota	.....	.....	.....	10	4	9	183	.....	7	.....	.....	.....	4	.....
Iowa	.....	.....	.....	5	.....	2	134	.....	2	.....	.....	.....	2	3
Missouri	.....	.....	1	.....	1	6	116	.....	4	.....	1	2	5	.....
North Dakota	.....	22	.....	2	.....	.....	50	.....	1	.....	.....	.....	1	.....
South Dakota	.....	1	.....	1	1	.....	25	.....	.....	.....	.....	1	.....	.....
Nebraska	1	.....	.....	4	.....	.....	51	.....	5	.....	.....	1	1	.....
Kansas	.....	.....	.....	2	.....	3	33	.....	.....	.....	.....	1	7	.....
SOUTH ATLANTIC														
Delaware	.....	.....	.....	3	.....	.....	4	.....	.....	.....	.....	.....	7	.....
Maryland [a]	2	.....	1	10	.....	23	16	4	1	.....	.....	2	22	.....
District of Columbia	.....	.....	.....	4	.....	10	7	.....	.....	.....	.....	.....	3	.....
Virginia	4	.....	81	10	4	40	34	4	9	.....	2	8	41	.....
West Virginia	3	.....	3	8	.....	2	18	.....	5	.....	.....	1	7	.....
North Carolina [1]	20	.....	.....	4	1	.....	13	5	10	.....	.....	1	30	.....
South Carolina	5	.....	9	7	1	16	10	.....	1	.....	.....	.....	2	3
Georgia	[1] 2	.....	5	8	.....	20	15	1	5	.....	.....	8	1	3
Florida	1	.....	.....	.....	1	3	6	.....	2	.....	1	4	6	.....

See footnotes at end of table.

Telegraphic case reports from State health officers for week ended Aug. 27, 1949—Continued

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever	Whooping cough	Rabies in animals
EAST SOUTH CENTRAL														
Kentucky	6				2	13	33					6	22	6
Tennessee	6	1	10	10		59	31	3	26		2	7	11	
Alabama	5		6	13	2	22	12	1	3			2	3	5
Mississippi [a]	13		3		1	11	10		1		1		3	
WEST SOUTH CENTRAL														
Arkansas	2	1		1	1	9	[1] 50	1	3		6	6	13	2
Louisiana	1	1	4	5		30	10		2		2	5	10	4
Oklahoma			14	3	1	10	62	1	3		2	2	6	
Texas	15	2	354	34		176	69	1	2		3	8	85	10
MOUNTAIN														
Montana			3	13	1		2		1				5	
Idaho	1		10	2			33		[d] 2			1	8	
Wyoming				1		2	9				1	1		
Colorado			9	8	1	12	53	1	3			1	5	1
New Mexico				8			14		1			4	2	
Arizona	5	2	13	5		1	13		1				16	
Utah [a]				4		1	12		1		2		20	
Nevada														
PACIFIC														
Washington	3		10	23		2	48		8			1	30	
Oregon		2		14		2	15		6				17	
California	6		8	50	3	18	101		[d] 12			3	133	4
Total	142	88	566	613	39	870	3,241	27	231		24	104	1,403	
Median, 1944–48	224	23	602	694	55		1,412	24	546	2	9	143	1,806	
Year to date 34 weeks	[1] 4,466	417	78,106	587,947	2,381	56,504	[1] 20,543	468	58,718	41	823	2,394	39,501	
Median, 1945–49	7,236	349	192,424	550,538	4,512		7,792	428	87,385	270	638	2,662	66,332	
Seasonal low week ends	(27th) July 9		(30th) July 30	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32d) Aug. 13	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	698		2,239	640,340	3,225		[1] 19,507		458	51		1,934	49,621	
Median, 1943–48 [b]	1,291		2,227	585,484	6,016		7,529		1,090	353		2,187	93,714	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for measles, meningitis, smallpox, and whooping cough the corresponding periods are 1943–44 to 1947–48.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately, as follows: Indiana 1, Virginia 4, Georgia 4, Florida 2, Kentucky 2, Tennessee 1, Louisiana 3, Texas 1, California 1. Cases reported as Salmonella infection, not included in the table, were as follows: Massachusetts 2, New York 4.
[1] Deductions.—Diphtheria cases: Georgia—week ended July 3, 3; July 30, 4; Aug. 6, 4; Aug. 13, 1. Poliomyelitis cases: Michigan—week ended Aug. 6, 1; Aug. 13, 2. Arkansas—week ended July 30, 2. Psittacosis cases: North Carolina—week ended June 18, 1.
Leprosy: California 1. *Relapsing fever:* California 2. Alaska: Diphtheria 1, measles 5. Hawaii Territory: Measles 1, poliomyelitis 1, scarlet fever 1.

FOREIGN REPORTS

BRITISH GUIANA

Measles.—Information dated August 23, 1949, states that according to a report made by the medical authorities on August 21, 1949, 29 deaths occurred during an epidemic of measles which broke out several weeks ago among the Macushi Indians in British Guiana. The disease is now said to have spread to the south savannahs, and it is estimated that a total of 600 persons (5 to 7 percent of the savannah's population) is infected.

CANADA

Provinces—Notifiable diseases—Week ended August 6, 1949.—During the week ended August 6, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1		10		16	120	2	39	16	51	255
Diphtheria					2						2
Dysentery:											
Amebic						2					2
Bacillary					1						1
Encephalitis, infectious							3	2			5
German measles			3		4	11	1	2	19	2	42
Influenza			34			2	2	4			42
Measles			6		45	76	24	172	29	112	464
Meningitis, meningococcal						2				2	4
Mumps			26		10	47	5	5	2	21	116
Poliomyelitis			6	1	43	87	4	3	6	24	174
Scarlet fever			3	3	8	17	1	1	4	3	40
Tuberculosis (all forms)	19		11	10	52	15	22	10		48	187
Typhoid and paratyphoid fever	1			3	5	5	1			1	16
Undulant fever					2						2
Venereal diseases:											
Gonorrhea	8		9	8	95	53	25	17	51	72	338
Syphilis			7	5	40	19	7	5	4	18	105
Whooping cough	1		3		64	13	2	7			90

EGYPT

El-Kantara—Typhoid fever.—Information dated August 18, 1949, states that according to reliable reports received at Port Said an outbreak of typhoid fever had been noted at El-Kantara, a town on the Suez Canal about 70 miles south of Port Said, and on the railway junction between Egypt and Palestine. The outbreak is said to have originated in Palestine refugee camps located in and around the town. About 60 cases had been registered at Kantara. No deaths had been reported.

FINLAND

Notifiable diseases—June 1949.—During the month of June 1949, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	9	Paratyphoid fever	196
Diphtheria	96	Poliomyelitis	5
Dysentery	2	Scarlet fever	215
Gonorrhea	710	Syphilis	56
Malaria	4	Typhoid fever	10

JAPAN

Notifiable diseases—5 weeks ended July 30, 1949, and accumulated totals for the year to date.—For the 5 weeks ended July 30, 1949, and for the year to date, certain notifiable diseases were reported in Japan as follows:

Disease	5 weeks ended July 30, 1949		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	881	79	9,321	950
Dysentery, unspecified	4,867	1,417	7,531	2,119
Encephalitis, Japanese "B"	11	6	16	8
Gonorrhea	18,135		110,408	
Influenza	100		1,777	
Malaria	896	11	2,466	35
Measles	20,146		147,570	
Meningitis, epidemic	129	38	908	258
Paratyphoid fever	318	19	1,241	53
Pneumonia	8,919		100,436	
Scarlet fever	426	6	2,993	42
Smallpox	6	1	122	12
Syphilis	18,058		121,146	
Tuberculosis	50,397		276,576	
Typhoid fever	873	92	3,310	392
Typhus fever	9	1	92	7
Whooping cough	20,927		68,092	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

NORWAY

Notifiable diseases—May 1949.—During the month of May 1949, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Anthrax	1	Malaria	1
Cerebrospinal meningitis	8	Measles	2,983
Diphtheria	16	Mumps	667
Dysentery, unspecified	1	Paratyphoid fever	4
Encephalitis, epidemic	1	Pneumonia (all forms)	2,371
Erysipelas	346	Poliomyelitis	4
Gastroenteritis	2,814	Rheumatic fever	111
Gonorrhea	294	Scabies	1,460
Hepatitis, epidemic	100	Scarlet fever	518
Impetigo contagiosa	2,000	Syphilis	65
Influenza	2,572	Tuberculosis (all forms)	379
Laryngitis	10,258	Weil's disease	3
Lymphogranuloma inguinale	1	Whooping cough	4,480

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Madras.—Cholera has been reported in the city of Madras, India, as follows: Week ended August 13, 1949, 52 cases, 4 deaths; week ended August 20, 38 cases, 4 deaths.

Plague

Basutoland.—Plague has been reported in Basutoland as follows: Week ended June 18, 1949, 4 cases, 3 deaths, in Mafeting District; week ended July 2, 1 fatal case in Mohale's Hoek District.

Belgian Congo—Stanleyville Province.—On August 12, 1949, 1 fatal case of plague was reported in Pimgo Village, Stanleyville Province, Belgian Congo.

Madagascar.—During the period July 21–31, 1949, 4 fatal cases of plague were reported in Madagascar.

Union of South Africa—Cape Province.—During the week ended August 13, 1949, 1 case of plague was reported at Rooiwal Farm in Gordonia District, and 2 suspected cases at Petwick Farm in Vryburg District, Cape Province, Union of South Africa.

Smallpox

Afghanistan.—During the period May 25–June 29, 1949, 52 cases of smallpox were reported in Afghanistan.

Arabia—Aden.—On August 22, 1949, 2 cases of smallpox were landed at Aden from a ship that arrived at that port from Batavia.

Portugal—Oporto.—During the week ended July 16, 1949, 1 case of smallpox was reported at Oporto, Portugal.

Typhus Fever

Afghanistan.—During the period May 25–June 29, 1949, 82 cases of typhus fever were reported in Afghanistan.

British East Africa—Tanganyika.—Dar-es-Salaam.—During the week ended July 9, 1949, 1 case of typhus fever was reported in Dar-es-Salaam, Tanganyika, British East Africa.

Yellow Fever

French Equatorial Africa—Bangui.—During the week ended August 20, 1949, 1 fatal suspected case of yellow fever was reported

in Bangui, French Equatorial Africa. The last previous report of yellow fever in French Equatorial Africa was made in December 1946, of cases occurring in Carnot, Ubangi Shari Department.

Peru—San Martin Department.—On June 23, 1949, 1 death from yellow fever was reported in Tarapoto, San Martin Department, Peru.

DEATHS DURING WEEK ENDED AUG. 20, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Aug. 20, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,529	8,115
Median for 3 prior years	8,115	
Total deaths, first 33 weeks of year	307,814	307,980
Deaths under 1 year of age	725	621
Median for 3 prior years	686	
Deaths under 1 year of age, first 33 weeks of year	21,635	22,128
Data from industrial insurance companies:		
Policies in force	70,242,785	70,951,356
Number of death claims	11,877	11,496
Death claims per 1,000 policies in force, annual rate	8.8	8.5
Death claims per 1,000 policies, first 33 weeks of year, annual rate	9.4	9.6

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, U. S. Government Printing Office Washington 25, D. C.
Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 SEPTEMBER 23, 1949 NUMBER 38

IN THIS ISSUE

Specific Gravity of Ragweed Pollen
Estimation of Chronic Disease Prevalence
Plague Surveillance Traps Compared

U.S. PUBLIC HEALTH SERVICE 1798

FEDERAL SECURITY AGENCY

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FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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CONTENTS

Page

Determination of the specific gravity of ragweed pollen (*Ambrosia elatior*) and conversion of gravity sample counts to volumetric incidence. James H. Crawford ... 1195

Estimation of chronic disease prevalence with particular reference to syphilis. Harold A. Kahn and Harry B. Smith ... 1201

Snap traps versus cage traps in plague surveillance. Bertram Gross and David D. Bonnet ... 1214

INCIDENCE OF DISEASE

United States:
- Reports from States for week ended September 3, 1949 ... 1217
- Plague infection in Park County, Colorado ... 1220
- Deaths during week ended August 27, 1949 ... 1220

Foreign reports:
- Canada—Provinces—Notifiable diseases—Week ended August 13, 1949 ... 1221
- Madagascar—Notifiable diseases—July 1949 ... 1221
- Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—
  - Smallpox ... 1222
  - Typhus fever ... 1222
  - Yellow fever ... 1222

Public Health Reports

Vol. 64 • SEPTEMBER 23, 1949 • *No. 38*

Determination of the Specific Gravity of Ragweed Pollen (*Ambrosia elatior*) and Conversion of Gravity Sample Counts to Volumetric Incidence

By JAMES H. CRAWFORD*

Specific Gravity Determinations

This study is part of an investigation of the spread of pollen from a given point or aerial source by a turbulent wind. Since the rate of diffusion in the direction of wind motion is a function of the specific gravity of the individual pollen grain, it was felt necessary to reinvestigate the latter by more accurate methods than heretofore used. The need for accurate specific gravity data has been fully discussed by Durham (*1*, *2*).

In the determination of the specific gravity of pollen grains, it should be remembered that this material is hygroscopic causing the specific gravity to vary with the moisture content of the air. In this study a commercially dried pollen from the common ragweed, *Ambrosia elatior*, was used. Before the test was started the pollen was taken from the bottle and exposed to the air in the laboratory for at least 24 hours. Durham (*1*), in discussing some of the characteristics of pollen grains, points out that while extreme moisture absorption may cause appreciable changes in the weight and volume of pollen grains, it is quite likely that free-floating pollen usually contains little, if any, more moisture than commercially dried pollen. It was found that after exposure to the air in the laboratory there was no appreciable change in the weight of the ragweed pollen used in the present study.

The specific gravity of various pollens is generally stated to be less than 1.00. Usual values range from 0.50 to 1.00. These values are exceptionally low considering that cellulose and proteins have specific gravities in excess of 1.00. The low values for the specific gravity of pollens probably indicate that the pollen grains are made up from a spongelike mass. The following data indicate that pollen grains are probably more uniformly dense than is generally supposed.

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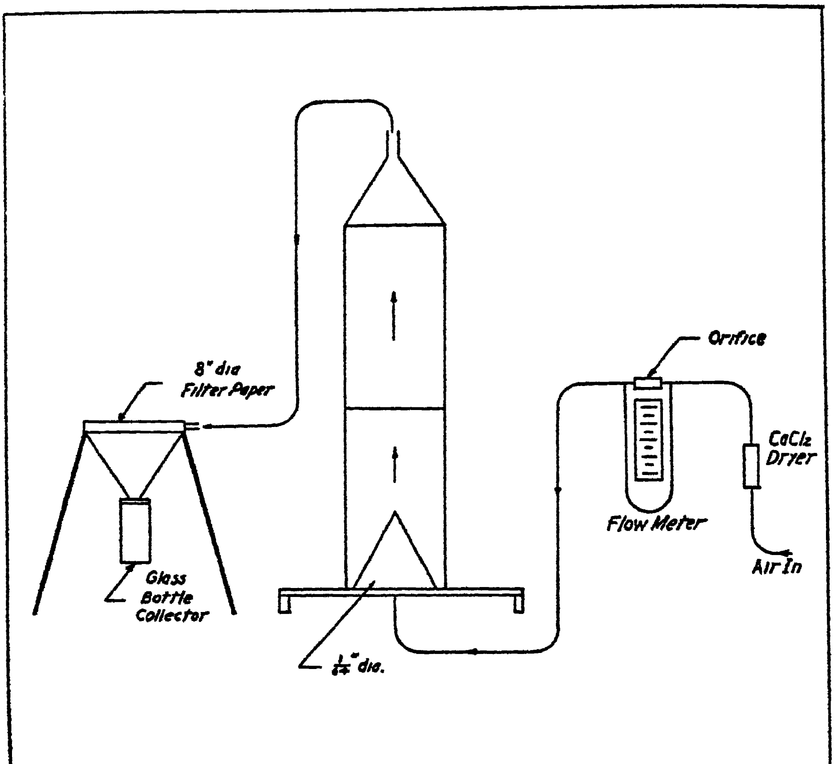
* Sanitary engineer (R), Communicable Disease Center, Public Health Service, Atlanta, Ga. Presented at the 1949 spring meeting of the Georgia Academy of Science while the author was a student in the Department of Public Health, Georgia Institute of Technology, Atlanta, Ga.

The rate of fall of pollen grains has been studied by various investigators (*1, 3, 4*). The method used consisted in observing the time taken for pollen grains to fall through a cylinder of known length. Pollen was allowed to enter the top of a cylinder and the time of its first appearance on a clean disc placed at the bottom of the cylinder at fixed intervals was noted.

Since the pollen used in this study proved to have grains of more or less uniform diameters, the calculation of the specific gravity of the individual grains by the application of Stokes' law was not a difficult task.

The method used in this study to determine the rate of fall of ragweed pollen is in a sense the reverse of that used by the investigators cited above. Instead of determining the time of fall of single pollen grains, the minimum velocity required to lift and convey pollen grains was measured. This was accomplished by means of an elutriator shown in the figure. Because of the uniformity of the pollen grains, this device was particularly effective.

The procedure used was as follows: Pollen was placed in the cyl-



Elutriator used for the determination of pollen density.

inder at the bottom of the elutriator—at the base of the cone. The cone was so constructed that dry air supplied through a series of $^{1}{}_{64}$-inch diameter holes, arranged so as to give a tangential motion to the air, caused the particles to be swept upward through the vertical cylinder.

When sufficient volume of air is blown through the tangential holes, the particles rise to the full height of the cylinder and are collected on a filtér paper. Starting with a flow of air insufficient to raise the pollen grains, the flow was gradually increased and the filter paper was examined after a lapse of time sufficient to allow the pollen to pass from the base of the cone to the filter. The filter paper was then removed and examined under the microscope for pollen.

The volume of the air being known, the average velocity of flow across the elutriator cylinder is computed. Since in all experiments the flow was streamlined, the axial velocity is twice the average velocity determined from the volume of air measured and the cross-sectional area of the elutriator cylinder. Moreover, it is the axial velocity which governs, since the pollen grains moving along the axis of the elutriator where the air velocity is maximum will appear first on the filter paper. This is exactly the same velocity the pollen would have in free fall as in the experiments of Durham. The rate of fall, determined by this method, was 1.6 cm. per sec. or 0.0525 ft. per sec. which is approximately 80 percent higher than velocities obtained by other investigators for pollen of the common ragweed by the free-fall method.

The calculations for the determination of the specific gravity of the pollen grains are simple and the steps are as follows:

(1) The average air velocity is obtained by dividing the volume of air needed to show the first evidence of pollen grains on the filter paper by the cross-sectional area of the elutriator.

(2) Since the axial velocity governs, and since this is twice the average velocity we have

$$v \text{ (axial velocity)} = 2v \text{ (average velocity)}.$$

(3) Stokes' law for the velocity of free fall of particles, when the motion is steady is

$$v = \frac{(\rho_p - \rho_a)\, 2gr^2}{9\mu}$$

where ρ_p is the density of the particle, ρ_a the density of air, r the particle radius, and μ the viscosity of air. Since ρ_a is negligible in comparison with ρ_p, we may then write that

$$\rho_p = \frac{9\mu v}{2gr^2}$$

The pollen grains studied were remarkably uniform and ranged from 18 to 22 microns in diameter. Using an average diameter of 20 microns (20×10^{-4} cm.), and since for air, μ equals 180×10^{-6} poise, we get

$$\rho_p = 0.83v$$

If v is in cm. per sec. and represents the axial velocity through the elutriator, the specific gravity of the pollen is readily determined.

In this experiment it was found that the volume of air passed through the elutriator when the pollen appeared on the filter paper was 0.305 cu. ft. per min. Since the diameter of the elutriator cylinder was 6 inches, we obtain for the average velocity 0.79 cm. per sec. The axial velocity is, therefore, 2×0.79 or 1.58 cm. per sec. so that

$$\rho_p = 0.83 \times 1.58 \text{ or } 1.30 \text{ (specific gr.)}$$

The value thus obtained is roughly 2.4 times the probable outdoor mean specific gravity published by Durham (*1*). This result was so surprising that it was decided to check it by a totally different technique, namely the permeameter method of surface measurement. This method has been fully described by Blaine (*5*). It consists of measuring the pressure drop through a small column packed with the material the surface of which is to be measured By using a relation involving the pressure drop and the porosity of the material, the surface is easily calculated. If S_w represents the surface per gram of pollen as measured by the permeameter, then

$$S_w = \frac{6}{\rho d}$$

where the terms have the same meaning as in the formula given above. Substituting the value obtained for S_w which in this instance was 2280 cm. per gm. of pollen, and putting d equals 20×10^{-4} cm., we have

$$\rho_p = \frac{\;}{S_w d}$$

we again obtain a value of 1.3 for the specific gravity checking the results already obtained from the elutriation technique.

The specific gravity of ragweed (*A. elatior*) pollen, determined in the manner described, warrants the assumption that pollen grains have specific gravities approaching that of cellulose and that they cannot be considered as possessing a spongelike structure. The difference in the results reported in this paper and those of others is primarily one of technique. Pollen grains are easily charged, and in

free fall undoubtedly deviate from a direct straight line of fall. By elutriation, the air acts as a carrier so that this influence is minimized. The check result obtained by the permeameter can hardly be fortuitous, considering that the pollen grains were remarkably uniform and that errors are less than those obtained by irregular particles. In the latter instance it is estimated that surface areas measured by the permeameter are probably within plus or minus 5 percent of the correct value.

Durham (*1*) found that common ragweed pollen, commercially dried, had a tendency to absorb very little moisture when taken from the container and exposed to the laboratory air. However, when placed in a humidifier, which would surely represent extreme outdoor conditions, the moisture absorbed represented about 65 percent of the weight of the bottled pollen. Durham further indicates that it was safe to infer that the dryness of bottled pollen would not differ essentially from that of free-floating pollen grains in dry warm weather.

Conversion of Gravity Samples to Volumetric Incidence

Two general methods have been devised for measuring the pollen in the air: volumetric methods and the so-called gravity methods. The gravity method is the more popular due to its simplicity. Various gravity methods for the collection of pollen grains have been described in the literature and need not be described at this point except to say that in general they consist of exposing a petrolatum or other adhesive treated microscope slide to the outdoor atmosphere for a period of time, usually 24 hours. The pollen grains thus collected are counted by means of the microscope.

Several attempts have been made by other investigators to interpret properly pollen numbers, collected by gravity methods, in terms of the number per unit volume of air. These attempts have met with little success, primarily because of the lack of knowledge of the true rate of fall. Also, factors other than the rate of fall and number of pollen grains in the air probably influence the number of pollen grains which will be collected on a slide during any particular period of time: wind velocities, variation in the specific gravity of the pollen grains due to humidity of the air, and air temperature.

Notwithstanding the variable factors, it appears that the gravity method will, under certain conditions, continue to be used as a method of sampling pollen from the air. Therefore, the following suggestion for a more logical interpretation of gravity collections, in terms of atmospheric incidence, is offered.

The rate of fall for common ragweed pollen, as determined in this study and previously noted, was 0.0525 ft. per sec. This value can

be substituted in the following formula which was derived by Scheppegrell (*6*) and revised by Dahl (*7*):

$$n=\frac{6.97\times N}{V\times t}$$

"where n is the approximate number of pollen grains per cubic yard of air, N the number of pollen grains per square centimeter of surface of exposed slide, V the velocity of fall of the pollen grain in feet per second, and t is time." The time should be expressed in hours. The author has checked the derivation of this formula.

By substituting the determined rate of fall for common ragweed pollen (0.0525 ft. per sec.) in the above formula we arrive at the following simplified form:

$$n=5.53\ N$$

The rates of fall for other pollens may be determined by the method used in this experiment and substituted in this formula thereby providing a method for converting gravity collections to atmospheric incidence.

ACKNOWLEDGMENTS

The assistance of Prof. H. A. Wyckoff, Department of Public Health, Georgia Institute of Technology, in the securing of materials and guiding the preliminary considerations of these experiments is gratefully acknowledged. Also, the author is indebted to Dr. J. M. DallaValle of the Chemical Engineering Department of the Georgia Institute of Technology, who was responsible for working out the procedures for the experiments and directly supervising the work.

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Estimation of Chronic Disease Prevalence With Particular Reference to Syphilis

By Harold A. Kahn, M. A., and Harry B. Smith, M. D., M. P. H.*

This study was undertaken to test in the field a method which might be an improvement over existing techniques for measuring disease prevalence. The proposed method was the examination by a physician of a random sample of individuals drawn from the population in which disease prevalence was to be estimated. The critical problem was the degree of voluntary acceptance of such examinations by the general public. The method was tried in Queen Anne's County, Md., in November 1948. The general findings suggest that the proposal is ineffective in the form attempted (31 percent refused examination). However, changed technique, based on experience gained in the trial, might reduce the refusal rate, perhaps to a level compatible with satisfactory estimates of the parameters involved.

Starting with the general idea that examination of a population sample by a physician is a possible improvement in estimation of disease prevalence or incidence, several specific questions have to be answered before a field trial is possible. These questions are:

1. What physicians are available for such examinations?
2. What fees will the physicians require for their services?
3. What places are available for conducting the examinations?
4. How much money is likely to be available for routine use of this method if it is found to be practical?

Low Cost Requirement

Considering the last question first, it was presumed that large sums would not be available and that the method should be tested by the cheapest means believed to have a possibility of success. With this factor in mind, it was necessary to depend on the physicians already operating disease control programs, namely the city and county health officers and their clinical assistants. By presuming that such physicians would be sufficiently interested to provide examination service without special charges and that the examinations could be held in existing health department quarters, the proposal was considered sufficiently practical (from a cost viewpoint) to warrant a trial.

*Health program analyst, Division of Venereal Disease, Public Health Service; and Deputy State and county health officer, Queen Anne's County, Md., and regional consultant in venereal diseases Maryland State Department of Health, respectively.

It was realized that the acceptance of a project of this type would result in a burden upon the local health officer and his staff, since it would be superimposed upon existing duties and responsibilities. However, without actual trial. the extent of this burden and particularly its evaluation in terms of results achieved could not be determined.

Selection of the Parameter to be Estimated

The proposal to measure chronic disease by examination of a random sample preceded any decision regarding the specific parameter to be estimated. Consideration was given to the three listed below:

1. The number of cases existent in the population on a specific date.
2. The number of persons in the population on a specific date who are or who ever have been afflicted.
3. The number of cases acquired in the population during a specific time interval.

The first two are alternative definitions of prevalence, and the last is a definition of incidence.

The definition of prevalence as a cumulation of all cases previously acquired by a given group is a concept proposed by Turner (*1*) in 1943 for syphilis morbidity measurement and could, of course, be used for other diseases too. Turner also defines incidence essentially as it is given above. The definition of prevalence as the existing cases is one which is used by many authors (*2*). Although incidence would be considered by many as the most useful single parameter to estimate, we do not know of any practical scheme for accurate estimation of this measure in a civilian population such as exists in this country. To illustrate the obvious difficulty in estimating the number of cases acquired during a stated time interval (incidence), the alternative theoretical methods and their practical difficulties are noted below:

1. If a new sample is selected each time, then the physician must be able to judge the onset of observed disease with sufficient accuracy to correctly include it or exclude it from the period being studied. In addition, he must be able to elicit a history or other satisfactory evidence of disease acquired during the period under study but not currently in evidence, i. e., "cured." For syphilis and many other chronic diseases, these abilities are severely limited by the nature of the disease and the knowledge of many patients.
2. Instead of selecting new samples each time, the same sample group may be examined in successive periods to detect disease acquired in the interval between examinations. However, not only may the exposure to a series of successive examinations change the health practices of the group so that they are no longer representative, but the inevitable losses from observation because of changed address will further complicate the unbiased estimate of incidence.

The practical choice for the present then is between the two definitions of prevalence. Briefly restated these are: (a) Existent cases in the population; (b) existent or cured cases in the population.

On several counts the first is much preferred. It presents the current problem faced by the control program. It ignores the counting of cases which are no longer a problem. It may be expected to decrease with current control program success and vice versa. It is affected by both of the major control program approaches, namely the prevention of disease or its successful treatment. For these reasons the proposed method for measuring chronic disease tested in this study was directed toward the estimation of the prevalence rate defined as the rate of existing disease per population unit. For syphilis, "existing disease" requires further definition before practical application. It is proposed that this further definition of "existing syphilis" be "syphilis for which treatment is recommended."

Description of the Universe Tested

One of the authors performed the medical examinations using the county health department in Centreville, Maryland, as the place of examination. Because of special interest in estimating syphilis prevalence, it was decided to select a population group for sampling which would produce useful syphilis prevalence estimates for a sample size of 100. This sample size number was believed sufficient for a first test of the method and was as large a group as could be examined with available facilities. However, the sample size of 100 was not sufficient upon which to estimate with a reasonable proportionate error the total population syphilis prevalence believed to be on the order of 1–4 percent. Although the first purpose of the trial was to test the method and in particular to determine the degree of nonresponse, it was desirable to plan the study so that syphilis estimates regarding the county would be included if the trial was successful. Therefore, in order to satisfy the dual objective of method trial and estimation of syphilis prevalence for some group in Queen Anne's County it was decided to specify the universe as Negro residents of Queen Anne's County, age 15 and over. This group was believed to have a syphilis prevalence on the order of 10–30 percent and could be estimated with much less proportionate error than the total county population given a sample of equal size.

Similarity of Proposed Method to New York and Michigan Studies

A review of the literature on health surveys revealed two previous attempts to obtain sickness data by physical examination of a selected sample of civilians. The first of these was reported by Wheeler (*3*) in 1937, and the second by Hoffer (*4*) in 1947. Both studies were

associated with a house-to-house canvass health survey and tried to judge the accuracy of the results by medical examination of a sample. From their reports it appears evident that neither author considered the obtaining of detailed information on refusal rate as an important part of the study and consequently the studies are not well designed to provide these data. It is noted that in both cases the examination was offered to entire families selected in the sample and not to individuals independently of family. This item is perhaps worthy of more comment since it relates to the efficient conduct of a health survey based on medical examinations.

It is likely that intrafamily correlation on the presence or absence of disease is high and positive for many communicable, hereditary or environmentally induced diseases. This being the case, for any sample in which the cost of medical examination is high in comparison to the increased cost of individual rather than familial selection, sample efficiency is greatly improved by the selection of individuals without regard to family. With this in mind as a probable feature of any practical medical examination survey, it is necessary to test refusal rate with individual selection as a part of the sample design. This similarity of test design and actual design is proposed principally for a reason that may not be self-evident. Since the main purpose of the test is to gather information on refusal rate, it is important not to confuse acceptance by an individual because his wife is going and he may as well join her, with refusal by the same individual if he is the only one selected in the family and is not sufficiently interested.

Sample Selection

For purposes of the survey "resident" was defined as those persons living in the county on the date of enumeration, excluding those who planned to leave the county within 2 months of enumeration date, either permanently or because of seasonal labor migration. The elements of the sample design chosen for this study were area sampling with systematic stratification; direct enumeration of individuals in the selected areas, and systematic subsampling of individuals with

Table 1. *Age-sex distribution of the 100 persons selected in the sample*

Age	Total	Male	Female	Age	Total	Male	Female
15–19	9	3	6	55–59	6	4	2
20–24	11	4	7	60–64	4	3	1
25–29	11	4	7	65–69	5	2	3
30–34	8	3	5	70–74	4	3	1
35–39	12	7	5	75–79	1	1	0
40–44	12	3	9				
45–49	8	5	3	Total	100	48	52
50–54	9	6	3				

age, area, and sex stratification. An age-sex distribution of the 100 persons selected for the sample survey is given in table 1.

Response of Sample to Proposed Examination

The residence and/or place of employment of each person selected in the sample were visited to explain the nature of the health survey and the selected individual's relation to it. The elements of the presentation to all individuals located were as follows: (a) Establishment of rapport; (b) explanation of the purpose and type of survey; (c) emphasis on "your number picked out of hat"; (d) emphasis on a thorough examination not just for one disease; (e) emphasis on voluntary nature of proposal; (f) emphasis on ineligibility of persons not selected; (g) suggestion of personal value for the individual; (h) inquiry regarding a convenient date for appointment.

Of the 100 persons in the sample, 69 accepted appointments and were examined. Appointments were accepted by 17 others who did not keep them and who refused or did not keep later appointments. Nine persons refused any appointment. Two were moving to Baltimore before the next open appointment date but seemed interested. One person was in "a hospital in Baltimore for pneumonia" during the entire period from enumeration to the close of examinations (December 23, 1948); one moved away immediately after the enumeration, and one was never located. Table 2 presents these data on response by sex and age-group. The smallest proportion examined, of the 4 age-sex groups, was 50 percent for the 22 females, age 40–79. Whether this is accidental or suggestive of a real difference in response due to greater suspicion, prudery, caution or some other trait in this population group is not known. It can be noted, however, that the variation of acceptance among the four groups is not greater than could arise by chance in one out of every six samples of this size from a universe with equal acceptance for all age-sex groups. (Chi-square equals 4.97 for 3 degrees of freedom.)

Table 2. *Response to proposed examination*

Category	Total	Male		Female	
		15–39	40–79	15–39	40–79
Accepted examination	69	15	20	23	11
Refused appointment	9	0	3	2	4
Didn't keep appointment	17	4	3	5	5
Other*	5	2	1	0	2
Total	100	21	27	30	22
Percent examined	69	71	74	77	50

*Moved, hospitalized or not located.

A classification by reason for refusal is presented in table 3 for the 31 persons who were not examined. The inclusion of the four who moved out of the area may be considered as a failure to correctly restrict the universe at the time of first enumeration. For larger areas than single counties this proportion could be expected to be smaller, but, in any case, it does not seem to be a failure of a method designed to estimate disease prevalence within a given area.

Table 3. *Persons not examined*

Reason given for refusal	Number persons	Number visits		Appointments accepted
		Total	Seen	
Moved	4	9	3	1
Hospitalized	1	5	0	0
Too busy	13	37	25	19
Feel well	5	12	10	3
No confidence in doctors	4	8	7	1
None given	4	12	6	4
Total	31	83	51	28

The one person not examined because of hospitalization may be considered a failure of the method to obtain advance cooperation of the hospitals covering the area to be surveyed. It is possible that hospitals will not permit inspection of their records for statistical use, but this seems unlikely if the proposal is made through the correct channels. Unfortunately this particular case was hospitalized in Baltimore and there was no opportunity to make the necessary personal contacts to obtain a record of the patient's examination findings.

After talking with these individuals, it is the authors' opinion that the 13 cases stating that they were too busy for examination offered this reason as a cover-up for their real reasons. There may have been two or three at most who we honestly believe could not spare time or energy for the examination during the hours offered. For these few, Saturday or Sunday hours would have helped. For the majority of the 13 who were "too busy"; for those 5 who stated it was "unnecessary since they felt well"; for the 4 who "had no confidence in" or "were afraid" of doctors; and for the remaining 4 for whom no reason was given: The most necessary corrective measure in our opinion is the removal of a social atmosphere of mistrust, suspicion and fear on the part of some members of the community surveyed to the offerings of the local health department. Whether this is simply part of a larger social relationship between nonwhites and government agencies and whether it is susceptible to simple

corrective measures for a limited activity such as a health survey, we do not know. However, our personal conviction based on face-to-face negotiation with the population sample and supported by the opinion of the Negro minister in Centreville (in a post-survey discussion) is that presurvey negotiation and discussion with community leaders would appreciably lower the nonresponse rate. The nature of this suggested groundwork should be to: (a) Give publicity to the forthcoming survey; (b) originate the publicity with accepted community leaders; (c) attempt to create a favorable group reaction rather than "sell" just the selected individuals.

It was noted that the one sample tract which was in Centreville, within easy walking distance of the health department, had 13 of the 31 refusals. Of the 100 persons selected for the sample, only 29 were in this tract. Thus the refusal rate for this tract was about 45 percent compared with about 25 percent for the remainder of the county.

Persons taking the examination were found to be unanimous in their opinion that it was very worth while, that it should be given periodically, and that they would recommend it to anyone who might ask their advice about it.

Examination Method and Coverage

Appointments for survey examinations were not to exceed 5 between 9–12 a. m. and 5 between 1–4 p. m. Examination dates were each day Monday through Friday, morning and afternoon, excepting holidays and a few periods of special health department activities. In addition, three health survey examinations could be scheduled concomitantly with the venereal disease clinic held Thursday nights from 6 to 8 p. m. Thus, for a typical week there was space for 40 appointments during "office hours" and 3, during Thursday night venereal disease clinics.

Persons accepting appointment were told to appear between 9 and 10:30 a. m. for morning periods, between 1 and 2:30 p. m. for afternoon periods, and between 6 and 7 p. m. for the Thursday night clinic. Two nurses were on duty full time to assist with the survey examinations. They interviewed patients for current medical complaints and took such measurements as height, weight, blood pressure, respiration, pulse rate, and oral temperature. The nurses also gave the patient a chest X-ray, audiometer test, and an eye test (Snellen chart). They collected blood and urine samples, and directed the patients to a screened area to undress and put on an examining gown. When these preliminary steps had been completed, the clinical examination was made. This clinical examination took about 15 minutes and covered the following listings on the examination record:

General appearance; skin; muscosae: teeth and tonsils; palms and soles; anus and genitalia: lymphatics; bones, joints, frame, muscles; liver and spleen: other abdominal; lungs; cardiovascular; central nervous system: eyes; ears; facial nerve.

The examination described was the best that available time and facilities could supply. However, the more complete the examination coverage, the more fruitful the survey will be. Of course, the principle of applying the complete examination on a routine basis to all persons in the sample, is necessary for extrapolation of results to the population sampled.

Additional tests and examinations, at a later date, were performed on those suspected of disease who could not be diagnosed on the initial examination.

Examination Findings

The results of examination for the 69 persons accepting it are summarized in table 4. Results of the audiometer and Snellen chart tests are not given in the table. They were omitted because audiometer testing was incomplete (the machine was frequently loaned to the school system and was not available for survey tests), and Snellen chart testing was performed without glasses when these were worn normally by the patient. The chart entry was stated as "Corr. visual acuity" but it was misunderstood. It is our opinion that a

Table 4. *Results of 69 health survey examinations*

Final diagnosis	Total number	Number recommended for treatment [1]
No evidence of disease	7	
Teeth carious or missing and not replaced	51	
Syphilis, total	29	14
Early latent	4	2
Late latent	19	11
Neurosyphilis	1	1
Cardiovascular	2	
Late congenital	2	
Unknown stage	1	
Hypertension	11	
Eye disease or injury	4	
Blind (one eye)	2	
Cataract (one eye)	1	
Involvement of extra-ocular muscles (one eye)	1	
Obesity	4	
Tuberculosis	2	
Diabetes, enlarged heart, mental deficiency, inguinal hernia, traumatic arthritis of hip, ichthiosis, vitiligo, varicose veins, Parkinson's disease, vaginal discharge (gonorrhea?), penis destroyed by destructive lesion (old granuloma inguinale?)	[2]	

[1] Applies to syphilis only. Indicates persons in whom syphilis is detected and who do not have prior adequate treatment.
[2] 1 (each).

visual defect satisfactorily corrected by glasses does not constitute a health problem.

Briefly restating the findings, as given in table 4, for diagnoses made in more than one individual, we note first that only 7 of the 69 persons were found to have no evidence of disease. Dental defects were observed in 51; syphilis in 29, only 14 of whom required treatment and are included in the estimate of prevalence made in this study; hypertension in 11; eye disease or injury in 4; obesity in 4; and tuberculosis in 2.

Deferring to a later section discussion of the possible nature and extent of bias due to nonresponse, the syphilis prevalence rate of Queen Anne's County Negro residents, age 15 or over, may be estimated at 20.7 percent.

The standard error for this estimate of syphilis prevalence is approximately 4.9 percent, and it is estimated that the range 20.7 percent ± 9.8 percent includes the population syphilis prevalence rate. The relative frequency of error in estimates of this class is 1 out of 20. Granted that this estimate is poor in terms of its large range, it is of some value considering the absence of other objective data on the subject. Also it should be realized that this study was conducted to test a method and was not intended as a suggested sample size for practical use. Following this thought, it is obvious that local areas which cannot undertake about 500 examinations would not find a method of this type practical for local estimates. However, an entire State might use a similar method for estimating State-wide parameters by distributing 500 examinations over 25 or more counties. The number of examinations would not then be burdensome for any one county, but neither would each county have usable local estimates.

Of course, the sample size required for satisfactory estimates of disease prevalence rates varies with the size of the rates being estimated. If it is accepted that a proportionate error in estimation limited to 25 percent (e. g., with an actual prevalence rate of 8 percent, the error is limited to 2 percent) in 9 out of 10 samples is satisfactory, then the approximate sample sizes required for several different parameters are given below:

Parameter percent	*Approximate sample size*
1	4,300
5	850
10	400
20	175

It can be noted from this brief table that required sample sizes are quite large for estimates of parameters below 5 percent. Perhaps estimates of these smaller parameters are practical only for the larger States, or groups of States pooling their sample requirements.

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Syphilis Examination Findings Versus Interview Statement

As previously stated, each person accepting examination was interviewed by a nurse. One of the questions included in this interview was: "Do you have syphilis or bad blood?" Table 5 presents the cross tabulation of this item as answered by the patients with the medical findings. It strongly suggests that syphilis prevalence data, as defined in this paper, cannot be accurately obtained by direct population interview.

Table 5

Patients' response to the question "Do you have syphilis or bad blood?"	Medical findings on the presence of syphilis requiring treatment		
	Total	Negative	Positive
No	65	53	12
Maybe	2	1	1
Yes	2	1	1
Total	69	55	14

Bias in Refusals

The degree of nonresponse (31 percent) found in this study would be of no major importance if it were not associated with health status. Unfortunately this is not known and, for safety, bias should be presumed to be present. It is for this reason that the proposed sampling method as described for Queen Anne's County is considered a failure in the form attempted (to the extent that the observed nonresponse is at all suggestive of what might be found in other universes). Although no money for the purpose was available in this study, it is possible that some later project might examine all volunteers and then offer the refusals payment for their acceptance in order to study the difference between groups.

In an attempt to obtain some evidence regarding the health status of the refusals in this study, the local venereal disease clinic records (filed since 1939) were searched for the names of all persons selected in this study. Records of previous diagnosis and treatment for syphilis in the local clinic were found for 19 of the 100 persons in the sample. Of the 31 persons not examined, 2, or 6.5 percent, were in the old record file. Of the 69 persons accepting examination, 17, or 24.6 percent, had old clinic records on file. If there actually were no difference between these percentages for the total population, less than 5 percent of all the samples which could be drawn of size 100 (including 69 acceptances or 69 refusals) would show percentage differences equal to or larger than observed in this sample. The knowledge that this difference in proportion is probably not entirely

due to chance is of little help in deciding the possibility of bias. At first glance it might seem that the nonrespondents are healthier, at least as regards syphilis status. However, on considering the implications of these data, at least the following additional hypotheses are equally suited to the evidence: (a) The nonrespondents use private rather than public medical care facilities in greater proportion than those accepting examination; (b) the nonrespondents use less medical care facilities of any type than those accepting examination.

Since hypotheses (a) and (b) are possibly, although not necessarily, contradictory to the first hypothesis presented, namely that the nonrespondents are healthier than those accepting examination, this study offers no objective data on the nature or extent of possible bias due to nonresponse. In the authors' opinion, those with existing pain or other obvious symptoms of disease are more likely to accept than others, and hence increase the estimation of total disease prevalence. For particular diseases or stages of disease characterized by the absence of obvious symptom, this "upward" bias would probably not exist.

Bias in Examination

It is believed that examination by a physician is superior to interview in determining the prevalence of specific diseases among a population group. However, it should be recognized that medical examination findings will vary with different physicians and that bias, in terms of departure from the average finding of all possible physicians, may be present in an indeterminate amount. Britten and Thompson (*5*) showed that percentage-defect findings among workers in different industries varied more than would be expected unless the different physicians had different standards for definition of defect. Sydenstricker and Britten (*6*) found that medical examination of life insurance policyholders resulted in a higher defect rate when examinations were made at the "central office" than when they were made in the "field." In establishing the kind of examination to be used in a prevalence study of this type, consideration should be given to as many objective measurements as possible in order to reduce variation and bias introduced by subjective standards of diagnosis.

Estimated Cost

Since dollar costs for the same article or service vary greatly with time and area, no attempt will be made to calculate this survey's expense in dollars. The following listing of time and car mileage spent by various persons assisting in conduct of the survey may be considered the "real" cost of the study:

Physician	7 working days.
Public health nurses	26 working days.
Venereal disease investigators	20 working days.
Statistician	25 working days.
Automobile mileage	2, 650 miles.

All working time was computed by prorating the percent of time spent in the health survey inasmuch as no persons were continuously occupied by full-time survey duties during its operation. Follow-up activities on syphilis and tuberculosis suspects are not included, because these are considered to be regular health department activities. In attempting to relate these data to dollar expense, it should be realized that the health officer and venereal disease investigators continued their regular duties concomitantly with survey operation.

Two remediable defects of the study contributed toward higher costs than necessary. These were the failure to overschedule appointments and the failure, in several instances, to get good addresses on enumeration, necessitating much visiting and questioning to locate the selected individuals.

Relationship to Routine Health Department Activity

Unquestionably, the survey added to the work load of health department personnel, but it is believed that routine activities did not suffer. Survey activities were skipped on days of special clinic activities; two of the four nurses conducted the survey examinations while the other two carried out the usual program; VD investigators assisted in areas they were visiting anyway; and the staff was generally cooperative.

Conclusion

This study of disease prevalence estimation has described the results of a technique proposed as a possible improvement.

The principal item on which the proposed technique is found to be unsatisfactory is the failure to approximate 100 percent acceptance of free physical examinations by a selected sample. The observed nonresponse rate of 31 percent is believed to be partly due to a failure to seek participation by community leaders in advance of the survey. It is hoped this participation can be obtained in advance of any future survey using this method. Objective data regarding bias in the prevalence estimates based on those accepting examinations are unavailable, and bias should be presumed sufficient to require approximately 100 percent acceptance until proved otherwise.

As a first attempt to obtain voluntary acceptance of free physical examinations by individuals selected at random, the study was poorly conducted from a viewpoint of efficiency in cost. However,

the expense for this sample of 100 with 69 examinations is not believed to suggest costs over the limits of practical application if the problem of bias can be solved. Costs are higher for estimates of small prevalence rates than they would be for those close to 50 percent. Most States with prevalence of specific diseases between 10–90 percent will probably find the cost of estimating these data, by a method of the type described in this paper, to be within practical limits. For estimating prevalance rates below 10 percent, costs increase rapidly and may exceed the resources of individual States. For estimates of these lower rates, regional or nation-wide surveys would be more practical although obviously less informative.

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Snap Traps Versus Cage Traps in Plague Surveillance

By BERTRAM GROSS, M. S., and DAVID D. BONNET, Ph. D.*

Plague infection is found in the Territory of Hawaii in two relatively small areas; one on the Island of Maui, and one on the Island of Hawaii. These areas, as well as adjacent areas, are under continual surveillance by the Bureau of Rodent Control, Department of Health, in order to detect the presence of active plague in rodents and fleas, and to define the plague region. Surveillance consists of regular and systematic daily trapping of rodents, combing for fleas, examination of trapped rodents for plague, and daily inoculation of guinea pigs with pooled rodent tissues and with macerated flea pools from individual districts. In addition to surveillance, the Bureau of Rodent Control carries on intensive plague suppressive measures within the known endemic areas including ratproofing, poisoning, gassing, trapping, clearing, DDT spraying and dusting, sanitary inspection, and education of the public in rodent control procedures.

From time to time a question has been raised concerning the advisability of using snap traps rather than cage traps, since it has been shown (*1*) that some of the rodent fleas leave the dead victims of snap traps within a few hours. This loss of fleas may increase the plague hazard to humans, since these fleas attempt to find a new individual host. Furthermore, there might be a reduction in the number of fleas which could be recovered for use in guinea-pig inoculations.

To evaluate this problem in a plague area in Hawaii, an experiment was performed to compare the results obtained from snap traps with the results obtained from cage traps. One hundred snap traps (Victor type) and one hundred cage traps (Marine type) were placed alternately 50 feet apart along a trap line in Kaholo Gulch, Hamakua, Hawaii (plague district 17A). The traps were baited similarly, using squares of coconut meat, and were examined, baited, and set daily during the early morning. All live rodents were gassed with cyanogas in the cages and immediately placed in paper bags, while dead rats secured in the snap traps were placed in paper bags and subsequently gassed to kill the fleas. Every effort was made to avoid the loss of fleas through handling.

The trial period began July 1, 1946, and ended November 25, 1946, thus making a total of 10,900 trap-days for each type of trap.

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Snap traps proved to be almost five times (4.9) more efficient than the cage traps in retrieving rodents as shown in table 1. The figures

Table 1. *Rodent catch*

	Rats caught	Percent	Mice caught	Percent	Total rodents	Percent
Snap traps	852	82.4	568	84.4	1,420	83.0
Cage traps	185	17.6	105	15.6	290	17.0

also indicate the probability that some mice were able to escape from the cage traps. Almost all of the animals taken were carefully combed and examined for fleas and the results are presented in table 2.

Table 2. *Flea recovery*

	Number rodents combed	Number infested with fleas	Number fleas recovered	Percent rodents infested	Average number fleas per infested rodent	Flea index*
Snap traps	1,317	73	88	5.5	1.2	0.07
Cage traps	262	27	47	10.3	1.7	.18

$$\text{*Flea index} = \frac{\text{Total fleas}}{\text{Total rodents examined}}$$

On a percentage basis, twice as many infested rodents were taken in the cage-trap series than were taken with the snap-trap series. This indicates that some rodents in the snap-trap group lost their fleas completely. This migration of fleas away from snap-trapped animals is also shown by a comparison of the average number of fleas per infested rodent, which was 1.2 in the snap-trapped group as against 1.7 in the cage-trapped series.

Although there is a loss of fleas with the use of snap traps compared to cage traps, it must be kept in mind that the recoveries were made with the same unit of effort for each series (10,900 trap days). Therefore with this same unit of work, 2.7 times as many infested rodents were obtained with snap traps and, from these rodents, 1.8 times as many fleas were recovered. Thus a greater number of fleas distributed over a greater number of rodents is obtained with snap traps. This is a desirable feature when the primary purpose of the trapping is plague surveillance and the fleas are utilized for guinea-pig inoculations. The loss of fleas from infested rats will not reduce appreciably the chance of plague detection, since it has been shown that one plague-infected flea out of a hundred (the remainder being noninfected) is readily detected by guinea-pig inoculation (*2*) and the loss of these fleas from snap-trapped animals is less than the number which would result from destroying an equal number of rodents by poisons.

Inasmuch as all places of human habitation are regularly treated with residual DDT, and because of the greater number of rodents destroyed and the increased efficiency of the plague-detection procedures by snap traps, it is the considered opinion of the authors that snap traps have definite advantages over cage traps in the type of continual plague surveillance carried on by the Bureau of Rodent Control, Department of Health, Territory of Hawaii in the Hamakua District, Island of Hawaii.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 3, 1949

A net decline of 47 cases was recorded in the incidence of poliomyelitis—from a total of 3,244 cases reported last week, to 3,197 for the current week. The total cases reported for the corresponding week last year was 1,505, an increase of 93 cases over the preceding week's total. The 5-year (1944–48) median is 1,505 cases. Currently, slight net decreases were reported in all of the 9 geographic divisions except the East North Central (818 cases last week to 902 for the current week), the East South Central (95 to 115), and the Mountain area (136 to 144).

Of the 38 States reporting currently more than 9 cases, 21 showing increases reported an aggregate of 1,577 cases (last week 1,365); 16 showing decreases reported 1,359 (last week 1,581). The 30 States reporting more than 19 cases each are as follows (last week's figures in parentheses): *Increases*—New Jersey 137 (122), Pennsylvania 78 (65), Ohio 171 (123), Indiana 61 (58), Illinois 282 (276) Michigan 287 (280), Wisconsin 101 (81), North Dakota 52 (50), South Dakota 38 (25), Kansas 52 (33), West Virginia 23 (18), Kentucky 60 (33), Tennessee 36 (31), Colorado 55 (53), Washington 50 (48); *decreases*—Maine 37 (44), New Hampshire 24 (32) Connecticut 56 (70), New York 538 (573), Minnesota 168 (183), Iowa 72 (134), Missouri 101 (116), Nebraska 39 (51), Virginia 27 (34), Arkansas 44 (50), Oklahoma 50 (62), Texas 63 (69), Idaho 27 (33), California 89 (101); *no change*—Massachusetts 194. For the year to date 23,740 cases have been reported, as compared with 12,657 for the same period last year and a 5-year median of 9,474.

During the week, 2 cases of relapsing fever were reported, in California. Of 15 cases of Rocky Mountain spotted fever reported in 8 Eastern and Central States, 4 occurred in North Carolina and 3 each in Maryland and Arkansas.

Deaths recorded during the week in 93 large cities in the United States totaled 8,458, as compared with 8,049 last week, 10,555 and 7,678, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 7,950. For the year to date the total is 323,771, same period last year, 326,660. Infant deaths totaled 672, last week 649, 3-year median 682, same week last year, 740. The cumulative figure is 22,939, corresponding period last year 23,560.

Telegraphic case reports from State health officers for week ended Sept. 3, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [a]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1	...	...	3	...	...	37	...	3	...	...	...	4	...
New Hampshire	...	...	...	...	...	...	24	...	...	...	...	...	...	...
Vermont	...	...	...	5	...	...	15	...	...	...	...	...	...	...
Massachusetts	1	...	...	21	...	...	194	...	10	...	...	...	98	...
Rhode Island	...	...	...	1	...	4	17	...	...	...	...	...	1	...
Connecticut	...	...	...	5	1	16	56	...	3	...	...	...	38	...
MIDDLE ATLANTIC														
New York	7	...	[c] 1	62	4	117	538	1	[d] 18	...	1	4	167	15
New Jersey	2	...	2	32	2	8	137	...	7	...	...	...	69	...
Pennsylvania	2	2	([c])	39	1	...	78	...	9	...	...	8	121	...
EAST NORTH CENTRAL														
Ohio	3	...	1	12	1	30	171	1	18	...	...	4	85	10
Indiana	23	...	...	6	...	3	61	...	1	...	1	...	7	4
Illinois	...	1	1	21	4	51	282	1	13	...	...	5	102	...
Michigan [a]	6	1	...	36	...	19	287	...	9	...	...	4	99	2
Wisconsin	...	...	...	28	1	2	101	...	3	...	...	...	107	...
WEST NORTH CENTRAL														
Minnesota	...	3	...	3	3	4	168	...	2	...	...	...	...	...
Iowa	1	...	...	6	...	3	72	...	1	...	...	...	...	4
Missouri	1	...	...	1	1	9	101	...	3	...	...	2	5	...
North Dakota	...	16	...	4	...	...	52	...	3	...	...	...	1	...
South Dakota	...	1	...	5	2	...	38	...	...	...	...	...	...	...
Nebraska	...	...	...	...	...	...	39	...	1	...	...	...	...	...
Kansas	1	1	...	3	...	4	52	...	2	...	...	...	3	1
SOUTH ATLANTIC														
Delaware	...	...	...	2	...	...	4	...	1	...	...	...	8	...
Maryland [a]	1	...	...	14	...	20	13	3	[d] 3	...	...	3	19	...
District of Columbia	1	...	...	2	...	13	7	...	...	...	...	...	6	...
Virginia	1	...	93	20	...	26	27	1	7	...	2	5	16	1
West Virginia	...	...	4	5	4	4	23	...	4	...	...	2	14	...
North Carolina	13	...	...	9	2	...	9	4	17	...	2	2	10	...
South Carolina	2	...	4	3	...	12	4	...	1	...	...	3	1	1
Georgia	6	...	14	10	1	87	5	1	8	...	1	5	7	5
Florida	1	...	1	10	...	6	14	...	4	...	...	1	2	1

EAST SOUTH CENTRAL														
Kentucky	2	-	-	-	-	1	60	-	6	-	-	3	11	7
Tennessee	3	-	28	6	2	9	36	-	12	-	-	6	17	-
Alabama	2	-	2	-	-	6	13	-	3	-	-	-	9	4
Mississippi [a]	4	-	2	13	-	6	6	-	1	-	-	1	5	-
WEST SOUTH CENTRAL														
Arkansas	7	-	16	1	1	15	44	3	6	-	7	11	13	2
Louisiana	2	-	-	1	-	12	7	-	3	-	-	3	1	-
Oklahoma	4	-	-	3	-	9	50	-	1	-	-	2	2	1
Texas	14	-	350	31	3	170	63	-	4	-	1	8	67	6
MOUNTAIN														
Montana	-	2	-	2	-	-	8	-	1	-	2	-	3	-
Idaho	1	-	-	2	-	-	27	-	1	-	1	3	13	-
Wyoming	-	-	-	1	1	-	7	-	-	-	1	1	-	-
Colorado	-	-	6	1	-	4	55	-	2	-	-	1	1	-
New Mexico	-	-	1	8	-	11	16	-	-	-	-	1	4	-
Arizona	3	-	17	9	-	4	11	-	-	-	-	1	11	-
Utah [a]	-	-	-	25	-	-	19	-	-	-	-	-	31	-
Nevada	-	-	-	-	-	-	1	-	-	-	-	-	9	-
PACIFIC														
Washington	-	-	1	13	1	-	50	-	11	-	-	-	22	-
Oregon	-	-	4	15	-	4	9	-	6	-	-	-	20	-
California	5	1	-	72	5	15	89	-	[d] 12	-	-	5	80	3
Total	120	28	548	571	40	704	3,197	15	220	-	19	94	1,309	-
Median, 1944–48	193	29	617	680	56	-	1,505	16	527	-	13	123	1,970	-
Year to date, 35 weeks	4,586	445	78,654	588,518	2,421	57,298	23,740	483	58,938	41	842	2,488	40,900	-
Median, 1944–48	7,889	363	193,041	551,414	4,568	-	9,474	444	63,252	273	647	2,785	63,302	-
Seasonal low week ends	(27th) July 9	-	(30th) July 30	(35th) Sept. 4	(37th) Sept. 18	-	(11th) Mar. 19	-	(32nd) Aug. 13	(35th) Sept. 4	-	(11th) Mar. 19	(39th) Oct. 2	-
Since seasonal low week	818	-	2,787	640,911	3,265	-	22,824	-	678	51	-	2,028	50,933	-
Median, 1944–49 [b]	1,496	-	2,844	586,282	6,072	-	9,211	-	1,617	355	-	2,310	95,404	-

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for measles, meningitis, smallpox, and whooping cough, the corresponding periods are 1943–44 to 1947–48.
[c] New York and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately, as follows: Virginia 1, North Carolina 1, South Carolina 1, Georgia 1, Louisiana 1, Texas 1, Wyoming 1, and California 3. Cases reported as Salmonella infection, not included in the table, were as follows: Massachusetts 4, and New York 1.

Relapsing fever: California 2.
Alaska: Influenza 1.
Hawaii Territory: Measles 5, typhoid fever 1.

PLAGUE INFECTION IN PARK COUNTY, COLO.

Under date of August 26, plague infection was reported proved in a pool of 16 fleas obtained on August 11 by flagging the openings of burrows of prairie dogs, *Cynomys gunnisoni*, in an area 2 miles south of Fairplay, Park County, Colo.; in a pool of 55 fleas obtained on August 12 in the same manner from burrows of prairie dogs of the same species at a location approximately 15 miles southwest of Fairplay; and in a pool of 5 fleas from 1 pocket gopher, *Thomomys* sp., trapped August 11 in the locality first described above.

DEATHS DURING WEEK ENDED AUG. 27, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Aug. 27, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,060	8,746
Median for 3 prior years	8,418	
Total deaths, first 34 weeks of year	315,874	316,726
Deaths under 1 year of age	649	705
Median for 3 prior years	719	
Deaths under 1 year of age, first 34 weeks of year	22,284	22,833
Data from industrial insurance companies:		
Policies in force	70,222,284	70,939,272
Number of death claims	12,617	9,590
Death claims per 1,000 policies in force, annual rate	9.4	7.1
Death claims per 1,000 policies, first 34 weeks of year, annual rate	9.4	9.6

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended August 13, 1949.—During the week ended August 13, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1		13		16	40	8	14	31	16	139
Diphtheria					3						3
Dysentery, bacillary					7	1					8
Encephalitis, infectious						1	1	1			3
German measles			2		1	7	3	1	3	1	18
Influenza			1			5	2	1			9
Measles			4		31	58	27	67	49	36	272
Meningitis, meningococcal			1			1				1	3
Mumps			2	1	3	55	2	2	5	26	96
Poliomyelitis			12	1	61	125	5		2		206
Scarlet fever				1	6	20	1		6	5	39
Tuberculosis (all forms)	13		5	6	90	21	59	7		39	240
Typhoid and paratyphoid fever					7	7				3	17
Undulant fever							1				1
Venereal diseases:											
Gonorrhea	6		7	8	103	79	18	14		73	308
Syphilis	2		7	5	57	24	6	3		9	113
Whooping cough	1				61	36	3	6			107

MADAGASCAR

Notifiable diseases—July 1949.—Notifiable diseases were reported in Madagascar and Comoro Islands during July 1949 as follows:

Disease	July 1949			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Bilharziasis			80	0
Cerebrospinal meningitis			13	4
Diphtheria	1	0	2	0
Dysentery, amebic	13	0	217	2
Erysipelas			8	1
Influenza	68	0	4,387	57
Leprosy			23	2
Malaria	388	1	33,154	204
Measles	18	0	236	6
Mumps	1	0	88	0
Paratyphoid fever	1	0		
Plague			4	4
Pneumonia, broncho	3	1	378	63
Pneumonia, pneumococcic	1	1	589	64
Puerperal infection			7	3
Relapsing fever			1	0
Trachoma	1	0		
Tuberculosis, pulmonary	7	2	97	15
Typhoid fever	1	1	11	1
Whooping cough	1	0	286	12

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Smallpox

Afghanistan.—During the period June 23–July 23, 1949, 57 cases of smallpox were reported in Afghanistan.

French Equatorial Africa.—Smallpox has been reported in French Equatorial Africa as follows: June 21–30, 1949, 42 cases, 16 deaths; July 11–20, 18 cases, 5 deaths; July 21–30, 40 cases, 9 deaths.

Netherlands Indies—Java—Bandoeng and Batavia.—During the period July 3–16, 1949, 64 cases of smallpox were reported in Bandoeng, Java, and for the week ended July 23, 50 cases with 6 deaths were reported in that city; for the week ended August 20, 1949, 222 cases of smallpox were reported in Batavia, Java.

Typhus Fever

Czechoslovakia.—During the week ended August 13, 1949, 24 cases of typhus fever were reported in Czechoslovakia.

Yellow Fever

Gold Coast.—Yellow fever has been reported in Gold Coast as follows: In Winneba Area—on August 15, 1949, 1 death in Apam (a seaport), on August 16, 1 death in Akukuom, during the week ended August 13, 1 fatal suspected case in Nyakrom, on August 21, 1 suspected case in Nyakrom, and on August 23, 1 death in Nyakrom; in Oda Area, on August 29, 1 suspected case in Esuboni.

+ + +

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 SEPTEMBER 30, 1949 NUMBER 39

IN THIS ISSUE

Effects of Reservoirs on Stream Water Quality

Q Fever in Eastern Washington

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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CONTENTS

	Page
Effects of reservoir operation on stream water quality. R. L. Woodward and M. LeBosquet, Jr	1223
Incidence of Q fever in eastern Washington. A serological survey. Raja Doddananjayya	1230
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended September 10, 1949	1237
Foreign reports:	
Australia—Victoria State and Melbourne City—Poliomyelitis	1240
Canada—Provinces—Notifiable diseases—Week ended August 20, 1949	1240
Cuba—	
Habana—Notifiable diseases—4 weeks ended June 25, 1949	1240
Provinces—Notifiable diseases—4 weeks ended June 25, 1949	1241
Korea—Encephalitis, Japanese "B"	1241
World distribution of cholera, plague, smallpox, typhus fever, and yellow fever—	
Cholera	1241
Plague	1242
Smallpox	1243
Typhus fever	1244
Yellow fever	1246
Deaths during week ended September 3, 1949	1246

Public Health Reports

Vol. 64 • SEPTEMBER 30, 1949 • *No. 39*

Effects of Reservoir Operation on Stream Water Quality

By R. L. Woodward and M. LeBosquet, Jr.*

During the past 15 years there has been a great increase in interest in conservation of our natural resources generally and of our water resources in particular. Many dams and reservoirs have been constructed by the Federal Government and many more have been authorized for construction for flood control, irrigation, navigation improvement and power production. Some of these projects have been built to serve a single purpose but there has been an increasing tendency toward multiple-purpose projects. In an increasing number of instances the possible effects of the developments, beneficial or detrimental, on water quality are being considered.

It is frequently possible and practical to make important improvements in water quality by proper operation of a reservoir. Such improvements may be obtained without any special provisions or they may require the specific allocation of storage. The benefits that may be obtained and the damages that may be caused must be considered if the maximum benefit is to be derived from any development. These benefits and damages can be evaluated, at least in part, in monetary terms and in some cases they are of considerable magnitude.

For the past 10 years the Public Health Service has cooperated with various district offices of the Army Corps of Engineers in investigating water quality aspects of water control projects. Certain general principles have been recognized in this work and are the subject of this discussion.

In general, where wastes are discharged into flowing streams, the seriousness and extent of the damage caused by the resulting pollution depends upon the volume of stream flow as related to the amount and strength of the wastes discharged. A variety of other factors are involved, so that it is not practicable to establish standard dilution ratios which would be generally applicable. Nevertheless, the dilution available is one of the most important factors governing the

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extent and seriousness of pollution. Therefore, pollution damage can be decreased either by reducing the waste load or by increasing the volume of dilution water. Since most streams have widely varying natural flows and since the design of waste treatment works must be based upon critical low-flow conditions, it frequently is possible to reduce the degree of treatment required by storing flood waters for release during low-flow periods.

Several important qualifications to these statements must be made. For many types of wastes, dilution alone cannot be considered an entirely satisfactory substitute for treatment, at least within the range of dilutions which it might be practicable to provide. For example, oils and other floating solids will be objectionable in many cases regardless of dilution water available. Settleable solids, either putrescible or inert, will not be greatly affected by added dilution. Sludge deposits from sewage or other organic wastes may exert an effect on the stream that is disproportionate to the pollution load in solution and in suspension in the stream. The wastes from coal washeries and from placer mining operations are examples of inert wastes.

Neither is dilution usually a suitable solution for problems of bacterial pollution. In such cases, the effect of dilution may be offset by the reduced time of flow from the source of pollution to the point of water use with fewer organisms dying in the shorter time period. For such pollution problems, waste treatment is essential to solution of the problem and although additional dilution may be a valuable supplement to treatment, it cannot be considered a satisfactory substitute.

Low-flow augmentation can benefit water quality in other ways than by reducing the degree of waste treatment needed. In most streams the water during low-flow periods is more highly mineralized and harder than during periods of high flow. By storing a part of the softer water from periods of high surface run-off and releasing it during low-flow periods, the chemical quality at downstream points often can be improved. In special cases other types of benefits may be important. For instance, in areas where acid mine drainage is an important type of pollution, it may be possible to reduce the acid damage by storing flood waters for release during low-flow periods when acid concentrations are highest. Certain periodically acid streams or portions of streams may even be made continuously alkaline in this way.

Temperature reduction due to increased low flows may be of major economic value where the stream is used intensively for cooling water. An outstanding example of this is the Mahoning River which serves the Youngstown steel district in northeastern Ohio. Natural minimum flows were only about one-twentieth of the cooling water demands, and water temperatures rose to about 120° F. due to the

repeated re-use of the stream water. These high temperatures not only decreased the usefulness of the water for cooling and increased the cost of cooling but even forced a curtailment of plant operations. High water temperature also increases the difficulty and cost of organic pollution abatement by reducing the solubility of oxygen and increasing the rate of decomposition of organic matter. Heat, in this case, can be considered a polluting agent. Flow regulation has aided greatly in overcoming the stream water temperature problem in the Mahoning Valley. Although this is an unusual situation, other places exist where industrial water use is intensive, and resulting high water temperature is a problem.

Water impoundments may create certain hazards and have some damaging effects on water quality. Although these are generally of less importance than the beneficial effects, they cannot be disregarded. Impoundment of water may aggravate the pollution problems of towns or industries along the reservoir shoreline. The reaeration capacity of streams, and in fact the self-purification capacity of the streams, varies with the velocity of flow. By changing a free-flowing stream into an arm of a reservoir with little current, the quality of the water at and near the source of pollution may be seriously affected. This has been quite noticeable on canalized rivers. Where the size of the reservoir and the amount of water available for dilution of the wastes is great, this effect is less serious.

A hazard to water works intakes may also be created by water impoundments. On free-flowing streams a water works intake may be safely placed a short distance above sources of pollution. Where this has been done and the stream subsequently becomes part of a reservoir, there is danger that wastes which formerly were carried away from the water intake may be carried toward it. The situation at Harriman, Tenn., is a notable example of this. At Cincinnati, Ohio, there is evidence that pollution from the city has traveled upstream to the water works intake even though the downstream velocity in the Ohio River is normally much greater than would be found in most reservoirs.

Water supplies downstream from a reservoir may be adversely affected if conditions in the reservoir are favorable for heavy production of algae. Obnoxious tastes and odors may be imparted to the water and necessitate special treatment for their removal. The services of an expert aquatic biologist are generally needed to predict the probable importance of such effects.

Where flow regulation is complete enough to eliminate the seasonal scouring of deposited material, some detriment may result. However, such complete regulation is quite unusual.

The operation of reservoirs for power generation frequently gives rise to very great fluctuations in flow in accordance with power

may be permitted. Where seasonal industrial operations, such as canneries, beet sugar refineries, or distilleries, contribute important quantities of wastes, critical stream conditions may occur during their peak seasons and the design stream flow would be chosen accordingly.

In determining the cost of treatment, it is generally not feasible to make individual studies of each community or industry concerned. If consulting engineers' estimates are available, they can be used with suitable adjustments for changes in costs. Otherwise it is generally necessary to use average cost figures from existing plants. As pointed out previously, flow regulation cannot be considered an adequate substitute for primary treatment of sewage or of many kinds of industrial wastes. Consequently, flow regulation in such cases will effect a saving in waste treatment cost only insofar as it makes possible the elimination or a reduction in the degree of more complete treatment than plain sedimentation. The costs of providing this additional treatment are less variable than the costs of intercepting the wastes and providing the site and initial units for the treatment plant. Consequently, the errors introduced through the use of average cost figures will not usually be serious.

Estimates of the benefits due to reduction in water hardness can be made by determining the reduction in hardness at various downstream points due to flow regulation. From knowledge of water uses for which hardness is troublesome, estimates can be made of the cost of an equivalent improvement in quality by water treatment or of the extra cost of soap due to usage of harder water. A similar procedure can be followed in estimating benefits due to reduction in mineral content.

Careful studies of the damages due to acid mine drainage in the upper portions of the Ohio River drainage basin have been made in connection with the Ohio River Pollution Survey.[1] Heavy acid loads and severe corrosion damage would seldom be encountered in other parts of the country, but in this area it appears that both flow regulation and other corrective measures will be required to achieve the best results. The damages from acid mine drainage include increased hardness and acidity in municipal and industrial water supplies, and accelerated corrosion of river boats and barges, river and harbor structures, and power plants. During the Ohio River pollution survey, information on damages and costs of treatment was obtained directly from the municipalities, industries, transportation and power companies concerned and from the United States Engineer Office. This information has afforded a basis for evaluating the benefits due to acid reduction which can be accomplished by low-flow regulation. In estimating such benefits a reservoir operating schedule is used which

[1] House Document 266, 78th Cong , 1st ses.

provides for storage of alkaline water during high flows and for release of this water to neutralize acidity during low-flow periods.

Water-temperature-reduction benefits can be estimated in a similar manner to those due to hardness, mineral content, and acid reduction. A study is made of water uses where temperature is an important consideration, the losses experienced due to high temperatures are determined, and the benefits at various points estimated from a knowledge of the rate of heat loss from water to air, the water and air temperatures, the water uses, and the stream flow. The principal industrial damages experienced on the Mahoning River were due to reduced power plant efficiencies because of poorer condenser operation, greater pumping costs and higher maintenance costs on various parts of the plant where the high temperature water was used.[2] Estimates of such damages were obtained from the industries affected. In addition, the degree of sewage treatment required to obtain a given stream water quality was increased because of the high temperatures.

Estimates of damage due to water impoundments can be made in similar ways. Reduction in reaeration capacity may require a higher degree of waste treatment than would be required without impoundment. The additional treatment cost is properly chargeable as a damage due to the impoundment. Where the reservoir endangers a water supply by making possible its pollution by wastes discharged downstream from it, the cost of correcting the situation by moving the water intake, the waste outlet, or by some other effective method, is a measure of the damage done.

In considering any of these benefits or damages, it is necessary to make estimates of probable future conditions. This presents no unusual difficulties in so far as domestic sewage is concerned but may be very difficult in the case of industrial waste discharges. Information on the plans of specific industries for expansion or process changes, information on new establishments expected, and study of past trends in industrial activity, may be used as guides in estimating future industrial waste loads. Increased dilution water during low-flow periods is of unquestioned value and benefit to water quality and it is believed that the methods adopted for estimating its monetary value provide a rational and conservative approach to the problem. Intangible benefits which are not evaluated are also important.

[2] The method used in dealing with this problem is discussed in detail in the article, Cooling-Water Benefits From Increased River Flows, by M. LeBosquet, Jr., Journal of the New England Waters Works Association, 60: 111-116, June 1946.

Incidence of Q Fever in Eastern Washington

— A Serological Survey —

By RAJA DODDANANJAYYA, Ph. D.*

Among the advances in knowledge of Q fever made during and after the recent war is the addition of new geographic areas to those in which it was previously known to occur. Prior to the last war the natural occurrence of this disease in man was considered limited to Australia (*3*, *8*) although the infectious agent was recovered from ticks in Montana by Davis and his colleagues as early as 1938 (*7*, *10*). However, one naturally acquired case of Q fever was reported from Montana in 1941 (*9*) and a few suspected cases (*5*). Recently the disease has been reported from scattered parts of the United States. The etiological agent *Coxiella burnetii* has also been recovered from different species of ticks in widely separated areas.

Although Washington presents geographic and climatic conditions differing from those of areas where natural outbreaks have been reported previously, it is one of the Northwestern States offering large areas suitable for cattle raising and has a proportionately higher percentage of cattle than many of the Eastern or other Western States. Cattle are thought to be a reservoir of the disease. Several species of ticks found in this area are identical with those known to harbor the rickettsia in other areas. Therefore, there is no reason to believe that the disease should not occur here.

Furthermore, the etiological agent of Q fever has been recovered from the Rocky Mountain wood tick *Dermacentor andersoni* in Montana (*7*) and from the Pacific coast tick *Dermacentor occidentalis* in Oregon (*5*). Sporadic natural infections have also been reported from Montana and Idaho. Since Idaho and Oregon border the State of Washington on the east and south, respectively, it was felt that a survey of the sera of animals in this area might be of value to determine if any reservoir of this disease is present.

The main objective was to determine whether this disease exists in eastern Washington, and if so, to estimate its prevalence. Our knowledge of the effects of Q fever in cattle and other domestic animals is obscure, although it is known that the disease causes an inapparent or mild infection in cattle (*11*, *12*). Recent publications reveal that the primary interest in Q fever in cattle is due to its public health aspects and to economic considerations. Occasional deaths may occur among

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infected animals. Infection may spread to associated animals as well as to man, and infected milk and meat products eventually may be excluded from certain markets.

The explosive nature of the human respiratory disease caused by *C. burnetii* as manifested in the recent outbreaks in the United States (*6, 14, 15*) and other countries (*13*) confronts public health officials with the problem as to how it best may be controlled or eradicated. The symptoms in many cases of Q fever in humans are so mild or inapparent that they escape diagnosis. Fortunately, the complement-fixation test is sufficiently accurate and sensitive to detect the specific antibodies in the sera of man and animals which are or have been infected by *C. burnetii.* Although the incidence of human Q fever in the United States appears to be low at present, the disease is considered important enough by leading public health officials to warrant thorough investigation. Therefore, it is considered that this study may be of some value to the people of this part of the State, and further investigation may protect the livestock industry against economic losses in the future.

Experimental Procedure

The variety of manifestations which accompany this disease entity often does not permit a specific diagnosis on clinical grounds alone. Therefore, the need for accurate serological tests to aid in the diagnosis of Q fever is apparent. Diagnosis of Q fever by serologic means is highly satisfactory (*1, 2*). Both complement-fixing and agglutinating antibodies appear in the sera of the patients. Complement-fixing antibodies appear in low dilutions as early as the seventh day of illness but may not be present until the thirteenth day. There is a progressive rise in antibody titer in each case until 21–30 days, after which it gradually falls. Unfortunately, very little information is available in the literature concerning the maximum period of persistence of antibodies following Q fever acquired under natural conditions.

The procedure followed in the complement-fixation test in this study was essentially as described by Bengston in 1944 (*2*). Instead of 1-hour fixation as recommended, the tests were placed in the refrigerator overnight, as is done in the Rocky Mountain Laboratory, Hamilton, Mont. The overnight fixation gives a somewhat higher titer and does not seem to increase nonspecific reactions over those obtained with 1-hour fixation. The sera inactivated by heating at 56° C. for 30 minutes were diluted serially in 0.2 ml. amounts. Two complement-fixing units of antigen were added in a volume of 0.2 ml. and followed by two full units of complement, likewise in a volume of 0.2 ml. The tubes were shaken and placed in the refrigerator overnight. The following morning 0.4 ml. of sensitized sheep red blood cells was added to each

tube. The tubes were incubated in a water bath at 37° C. for one-half hour and the results were read.[1]

Sources of Serum Specimens Examined

During the course of an 8-month period, 675 samples of blood sera of man and animals were examined to determine the presence of specific Q fever antibodies by complement-fixation procedure.[2] The samples were collected irrespective of the clinical diagnosis, though particular attention was focused on the sera of the patients suffering from respiratory infections. Since most of the outbreaks of Q fever have been found among persons in close contact with animals, it was thought advisable to study the blood sera of the junior and senior students of the College of Veterinary Medicine, as they had been in contact with animals for 2–4 years.

Samples of the blood sera from most of the animals of the State College of Washington beef and dairy herds were examined in addition to the usual routine blood samples obtained from the veterinary clinic. Since the brucellosis investigation unit of the college was expanding its program during the time of this study, it was possible to procure through its cooperation bovine sera from various ranches in the vicinity of Pullman. Through the cooperation of the United States Department of Agriculture and the Idaho Bureau of Animal Industry, Boise, Idaho, some animal sera were obtained from them also and tested for Q fever complement-fixing antibodies. Though main attention was focused in this study on cattle sera, examinations also were made of blood sera of horses, dogs, sheep, and foxes.[3]

The number of sera, the types of sera, and the percentage of positives are shown in table 1; human case histories with suggested source of

Table 1. *Summary of results of serological studies of sera from different sources*

Type of sera	Number of sera examined	Number of positive sera	Number of negative sera	Percentage of positive	Serum dilutions*					
					1:8	1:16	1:32	1:64	1:128	1:256
Human	289	6	283	2.076	0	3	1	1	1	0
Bovine	327	9	318	2.446	3	2	2	1	1	0
Canine (10 foxes)	27	0	27	0	0	0	0	0	0	0
Others (13 horses, 7 hogs, 12 sheep)	32	0	32	0	0	0	0	0	0	0
Totals	675	15	660	0	3	5	3	2	2	0

*Titers shown are highest dilutions in which sera reacted.

[1] The Q fever antigens used in this study were obtained from the Rocky Mountain Laboratory through the courtesy of Dr. R. R. Parker, Director, and David B. Lackman, Senior Scientist, Public Health Service, Hamilton, Mont.

[2] The samples of human sera were obtained from Finch Memorial Hospital, Pullman, Wash., through the courtesy of the hospital authorities.

[3] The samples of sera of foxes were obtained from the Fur Animal Disease Investigation Laboratory, Pullman, Wash.

infection and end titers of the sera in table 2; and descriptive histories of cattle and the end titers of the sera in table 3.

In this study all the sera, both human and animal, showing complement fixation in dilutions of 1:8 and above have been considered positive. Shepard and Huebner (*15*) consider complement fixation in dilutions of 1:4 and above in human sera and in dilutions of 1:8 and above in animal sera, as positive for Q fever.

Table 2. *Human case histories with suggested source of infection*

No.	Sex	Age	Period of occupational exposure with animals	Probable source of infection	Probable date of illness	End titer of the sera
1	F	26	4 years	Occupational [1]	Spring 1947	1:64
2	M	28	do	Occupational [1] or arthropod	Summer 1947	1:128
3	M	27	6 years	Occupational [1]	Spring 1947	1:32
4	M	22	Nil	Not known	Not known	1:16
5	M	21	do	do	do	1:16
6	F	20	do	do	do	1:16

[1] Student of the College of Veterinary Medicine, State College of Washington.

Table 3. *Descriptive histories of cattle showing antibodies specific for Q fever*

Case no	Identification No.	Location	Breed	Sex	Age in years	End titer of sera
1	9117	Coeur d'Alene, Idaho	Holstein	F	8	1:64
2	A 26	State College of Washington beef herd.	Angus	F	------	1:128
3	Vet. Clinic [1] 4771	Palouse, Wash	Shorthorn	M	3	1:32
4	32	State College of Washington beef herd.	do	F	15	1:8
5	A 71	do	Angus	F	1	1:16
6	A 67	do	do	F	2	1:8
7	14946	Palouse, Wash	Guernsey	F	5	1:16
8	Vet. Clinic [1] 30019	Colfax, Wash	Shorthorn	F	4	1:32
9	Vet. Clinic [1] 4675	Vet. Clinic [1]	Jersey	M	------	1:8

[1] Veterinary Clinic of the College of Veterinary Medicine, State College of Washington.

Discussion

Out of 289 samples of human sera examined, 6 were found to contain antibodies specific for Q fever with titers varying from 1:8 to 1:128. The percentage of positive sera among all samples from eastern Washington and neighboring Idaho, proved to be 2.076 percent in human beings, and 2.446 percent in cattle. The sera of all other species of animals were negative. It is interesting to note that the three positive human sera which showed higher titers were obtained from the students of the College of Veterinary Medicine. All three reported a past history of respiratory infection.

Case 1: A female native of Lewiston, Idaho, and a senior student in the College of Veterinary Medicine had a severe infection of upper respiratory tract, which she considered as "flu", during the spring of 1947 while in Pullman. The symptoms were those of cold and "flu"

with persistent headache. The duration of the illness was about a week and she was not hospitalized.

Case 2: A male senior student of the College of Veterinary Medicine had an attack of influenza-like infection while in Walla Walla during the summer of 1947. He had frequently visited the Blue Mountains for fishing prior to his illness. His illness lasted about 10 days.

Case 3: A male native of Ventura County, Calif., a junior student in the College of Veterinary Medicine had been in close contact with animals since 1940. He had worked in a packing plant during the summer of 1942 and in citrus pest control the succeeding year. He had an influenza-like infection with severe headache in the spring of 1947 while in Pullman.

Cases 4, 5 and 6: In the remaining three persons, the probable source of infection could not be traced since these persons had no occupational contact with animals. These three sera were obtained from patients in the Finch Memorial Hospital where they were undergoing treatment for conditions other than respiratory infections. These patients probably had past infection of Q fever since their sera showed low titers of complement-fixing antibodies and since there was no increase in the titers during the hospitalization period.

Most of the samples of the positive sera were sent to Dr. David B. Lackman, Rocky Mountain Laboratory, Hamilton, Mont., for confirmation of the results obtained and for further studies to determine any possible cross reactions of the sera with other rickettsial diseases. The sera were examined also for antibodies against *Pasteurella tularensis* or *Brucella tularensis* and the results were negative. The results reported by Dr. Lackman corresponded with those obtained here except for slight variations in the reading of the end titers of the sera. The sera showed no cross reactions with other rickettsial diseases.

A striking feature of the epidemiology of Q fever is its peculiar relationship to occupation or contact with animals. In this study the sera of the persons who had apparently the greatest exposure exhibited higher titers of complement-fixing antibodies specific for Q fever. They also showed a definite history of past infection of the upper respiratory tract. The patients whose sera showed lower titers failed to give any definite history of attacks particularly suggestive of Q fever. They might have undergone mild or inapparent attacks of this disease.

In the first three cases there had been definite contact with animals of various species, both in their previous history and in their work in the veterinary clinics. In case 3, a history of work in a meat packing plant and citrus pest control also was obtained. It is questionable whether these factors were related to the source of infection, since the person worked in these places about 6 to 7 years previously. The titer of antibodies probably indicates recent infection since antibodies

are reported to disappear within 3 to 4 years. From the histories of the cases, the persons probably acquired their antibodies in the course of their work in the veterinary clinics. The sera from a number of the students of veterinary medicine showed fixation in very low dilution. Such reactions, though below the diagnostic level, might be indicative of residual titers from pest infection.

In case 2, a blood-sucking anthropod vector might have been the source of infection, as the patient had visited the Blue Mountains, Walla Walla, for fishing many times prior to his illness.

Since cattle, sheep, and goats are the common animals reported to be naturally infected with Q fever, it seems logical to believe that these persons might have contracted the disease in the veterinary clinics through contact while attending the animals. Inasmuch as the number of sheep and goats treated in the clinics is small when compared to that of cattle, our attention is directed primarily on cattle. This is substantiated by the presence of complement-fixing antibodies specific for Q fever in the blood sera of cattle of this locality.

In cases 4, 5, and 6, there was no apparent association with the livestock industry. This suggests that the sources of infection or modes of spread of the disease are not limited to this particular industrial occupation. There is also evidence in the literature that Q fever is rarely, if ever, transmitted directly from one human to another. Dairy cows have been found infected with Q fever, and *C burnetii* has been recovered from raw milk (*12*, *15*). Hence, in the absence of evidence of a probable source of infection in the last 3 cases, it is reasonable to believe that infected raw milk or air-borne dust might have been the cause.

Animal Sera: Of the total nine positive sera, the first two showed fairly high titers of 1:64 and 1:128, respectively. Of the cattle sera studied, 2.446 percent showed antibodies specific for Q fever. The disease appeared to be present in the beef herd and absent from the dairy herd, although the absence of positive tests for Q fever in the dairy herd may be due to good sanitary practices. Also in contrast to the beef herd, the dairy herd, not put out to pasture, was not exposed to tick infestation. Out of more than 80 samples of the beef herd examined, 4 sera were found to have complement-fixing antibodies specific for Q fever with diagnostic titers. The serologically positive animals appeared healthy. No ticks were found on the animals; however, the examinations were made during winter when ticks are rarely present.

The serum of case 1 was obtained from the Idaho Bureau of Animal Industry and is one of the two which showed high titers. The animal blood samples of cases 3, 7, 8, and 9 were obtained from the veterinary clinic where the animals were undergoing treatment for various ailments. Two of these animals were from the nearby town of Palouse and one from Colfax, Wash.

The breed, age, and sex of the animals were not considered to be of interest, since complement-fixing antibodies were found in both sexes and in ages varying from 1 to 15 years.

The evidence presented indicates that Q fever exists in the eastern part of Washington and that cattle are an important reservoir.

Summary

1. Q fever exists in eastern Washington in both humans and animals.
2. Six of 289 samples of human sera examined showed Q fever complement-fixing antibodies, in titers of 1:8 to 1:128.
3. Three of the cases in humans were among students of the College of Veterinary Medicine who had been in close contact with animals.
4. Three of the persons whose sera were positive by the complement-fixation test for Q fever had no occupational contact with animals, and their histories gave no indication of previous respiratory infection suggestive of Q fever.
5. Nine of 327 samples of cattle sera showed Q fever antibodies, 2 in high titers.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 10, 1949

A decline was recorded in the reported incidence of poliomyelitis for the third consecutive week. A total of 2,701 cases was reported, as compared with 3,197 last week, a decrease of approximately 15 percent. The 5-year (1944–48) median is 1,498, and the figure for the corresponding week last year was 1,526, representing an increase of 21 cases (1.4 percent). Currently, net declines were reported in the New England area (from 343 cases last week to 284), the Middle Atlantic (753 to 518), the East North Central (902 to 714), the West North Central (522 to 452), and the East South Central (115 to 113). In the South Atlantic, West South Central, Mountain, and Pacific areas, each showing a slight net increase, an aggregate of 620 cases was reported (last week 562).

The 32 States reporting more than 18 cases each are as follows (last week's figures in parentheses): *Increases*—Maine 47 (37), Vermont 21 (15), Ohio 178 (171), Indiana 68 (61), Iowa 75 (72), South Dakota 44 (38), Nebraska 60 (39), West Virginia 27 (23), Georgia 21 (5), Mississippi 28 (6), Oklahoma 86 (50), Texas 65 (63), Idaho 28 (27), Colorado 77 (55), California 121 (89); *decreases*—Massachusetts 145 (194), Connecticut 43 (56), New York 336 (538), New Jersey 105 (137), Pennsylvania 77 (78), Illinois 191 (282), Michigan 195 (287), Wisconsin 82 (101), Minnesota 128 (168), Missouri 75 (101), North Dakota 23 (52), Kansas 47 (52), Virginia 21 (27), Kentucky 41 (60), Tennessee 32 (36), Arkansas 34 (44), Washington 34 (50). For the year to date, 26,457 cases have been reported, as compared with 14,183 for the same period last year and a 5-year median of 10,972.

One case of smallpox was reported during the week, in Kentucky. The total for the year to date is 42, same period last year 50, 5-year median 275.

A total of 7,776 deaths was recorded during the week in 93 large cities of the United States, as compared with 8,405 last week, 7,804 and 8,230, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,230. The total for the year to date is 329,380, as compared with 332,340 for the corresponding period last year. Infant deaths totaled 550, last week 656, same week last year 604, 3-year median 680. The cumulative figure is 23,006, same period last year 23,632.

Telegraphic case reports from State health officers for week ended Sept. 10, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	---	---	---	2	---	14	47	---	2	---	---	1	20	---
New Hampshire	---	---	---	---	---	---	18	---	---	---	---	---	4	---
Vermont	---	---	---	2	---	---	21	---	[d] 2	---	---	---	10	---
Massachusetts	---	---	---	4	1	---	145	---	7	---	---	---	98	---
Rhode Island	---	---	---	1	---	---	10	---	1	---	---	---	3	---
Connecticut	---	---	---	8	---	26	43	---	1	---	---	1	31	---
MIDDLE ATLANTIC														
New York	2	1	(c)	59	2	79	336	2	[d] 15	---	---	6	172	11
New Jersey	1	2	3	19	2	58	105	---	1	---	---	2	107	---
Pennsylvania	4	---	(c)	34	3	31	77	1	11	---	---	8	151	---
EAST NORTH CENTRAL														
Ohio	3	---	---	10	5	21	178	---	19	---	---	6	56	7
Indiana	5	2	---	9	---	3	68	---	10	---	---	2	44	4
Illinois	---	1	---	12	3	48	191	1	9	---	---	1	72	---
Michigan [a]	1	1	---	23	2	18	[1] 195	---	6	---	---	1	123	---
Wisconsin	---	1	3	36	---	2	82	---	2	---	---	---	46	---
WEST NORTH CENTRAL														
Minnesota	2	---	---	3	1	1	128	---	5	---	---	2	12	1
Iowa	---	---	---	4	---	---	75	---	3	---	---	---	1	1
Missouri	2	---	---	1	6	4	75	---	---	---	2	1	7	---
North Dakota	---	6	---	---	1	---	23	---	---	---	---	---	---	---
South Dakota	---	5	---	2	---	1	44	---	4	---	---	---	7	---
Nebraska	1	1	4	7	---	3	60	---	12	---	---	---	---	---
Kansas	1	---	---	52	---	4	47	1	6	---	---	1	10	---
SOUTH ATLANTIC														
Delaware	---	---	---	1	1	---	2	---	---	---	---	---	1	---
Maryland [a]	1	---	2	7	---	8	[1] 5	1	[d] 3	---	---	2	32	---
District of Columbia	---	---	---	---	---	7	11	---	---	---	---	---	---	---
Virginia	4	---	160	17	2	48	21	6	16	---	1	3	29	1
West Virginia	4	---	---	7	---	3	27	---	12	---	---	8	13	---
North Carolina	16	---	---	7	---	---	4	2	14	---	1	2	25	---
South Carolina	8	---	4	5	1	10	3	---	4	---	---	2	1	3
Georgia	12	---	2	1	1	6	21	---	12	---	4	5	2	6
Florida	2	---	---	1	1	16	12	---	---	---	2	1	2	---

EAST SOUTH CENTRAL														
Kentucky	8			2	3	37	41	1	11	1		8	60	8
Tennessee	2	1	12	12	2	32	32	1	16			2	24	
Alabama	13		9	10	1	11	12		12		1	4	11	2
Mississippi [a]	17		5	3	1	12	28		2		1		1	
WEST SOUTH CENTRAL														
Arkansas	3		13	9	1	11	34		3		9	4	19	2
Louisiana	6		1	1		18	6					5	1	
Oklahoma	1		9	2		11	86		1		1	3	11	3
Texas	15	1	299	26		147	65	1	13		3	14	80	16
MOUNTAIN														
Montana				7			13		2			1		
Idaho	1		2	2		2	28		d 3					
Wyoming				2	1	1	8				1			
Colorado		10	10	9	2	9	77		1			4	15	
New Mexico	1					9	7		1			3		
Arizona	5		6	8	1	4	6					1	11	
Utah [a]				3	1	1	12						3	
Nevada														
PACIFIC														
Washington				10	1		34		8				26	
Oregon			4	17		4	17		6			1	27	
California	5	2	3	42	3	21	121		d 16		1	9	72	1
Total	146	34	551	499	49	741	2,701	17	272	1	27	114	1,440	
Median, 1944–48	221	21	706	543	48		1,498	18	564	1	17	111	1,798	
Year to date, 36 weeks	4,732	479	79,205	589,017	2,470	58,039	[1] 26,457	500	59,210	42	869	2,602	42,340	
Median, 1944–48	7,527	390	193,473	552,229	4,616		10,972	461	88,476	275	666	2,886	70,100	
Seasonal low week ends	(27th) July 9		(30th) July 30	(35th) Sept. 3	(37th) Sept. 18		(11th) Mar. 19		(32d) Aug. 13	(35th) Sept. 3		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	964		3,338	499	3,314		[1] 25,541		950	1		2,142	52,373	
Median, 1944–45 to 1948–49 [b]	1,735		3,276	543	6,120		10,709		2,181	1		2,411	97,057	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for meningitis and whooping cough, the corresponding periods are 1943–44 to 1947–48.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately, as follows: Indiana 1, Georgia 2, Florida 1, Alabama 1, Louisiana 4, Oklahoma 1, Texas 3, Colorado 1, New Mexico 1, California 3. Cases reported as Salmonella infection, not included in the table, were as follows: Massachusetts 2, Pennsylvania 1.
[1] Poliomyelitis: Delayed reports, Maryland, July, and August onsets, 18 cases; deductions, Michigan, 1 case each, weeks ended August 20 and 27.
Alaska: Measles 7, pneumonia 3, streptococcal throat 2.
Hawaii Territory: Measles 2, lobar pneumonia 1, poliomyelitis 1.

FOREIGN REPORTS

AUSTRALIA

Victoria State and Melbourne City—Poliomyelitis.—According to information dated September 1, 1949, the State of Victoria, Australia, is experiencing the second worst epidemic of poliomyelitis in its history. From January 1–August 31, 1949, a total of 418 cases with 27 deaths is stated to have occurred. The total number of cases reported in the State of Victoria during the year 1948 was 32. A large number of the current cases are said to be in adults. Poliomyelitis has been declared epidemic in both the metropolitan area of Melbourne and the State of Victoria.

CANADA

Provinces—Notifiable diseases—Week ended August 20, 1949.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			5	2	12	18	3	15	16	27	98
Diphtheria				1	8	3					12
Dysentery:											
Amebic						1					1
Bacillary					4						4
Encephalitis, infectious						1		1	1		3
German measles					2	2		2	5	5	16
Influenza			31			4	1			1	37
Measles			15		40	18	22	40	46	69	250
Meningitis, meningococcal						1	1				2
Mumps			23		5	23	2	2	8	27	90
Poliomyelitis	1		2	7	86	128	4	5	10	9	252
Scarlet fever	1				11	5		2	5	2	26
Tuberculosis (all forms)			4	12	108	32	67	28	2	35	288
Typhoid and paratyphoid fever	3			1	6	1				3	14
Undulant fever					1	1					2
Venereal diseases:											
Gonorrhea	6		8	21	80	67	36	22	49	63	352
Syphilis			4	13	40	19	7	3	4	28	118
Whooping cough					70	28	3	4	8		113

CUBA

Habana—Notifiable diseases—4 weeks ended June 25, 1949.—Certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	10		Smallpox	1	
Diphtheria	13	1	Tuberculosis	10	1
Malaria	1		Typhoid fever	12	1
Measles	13				

Provinces—Notifiable diseases—4 weeks ended June 25, 1949.—Cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	4	18	11	15	2	8	58
Chickenpox		11	3			4	18
Diphtheria		15	4		1		20
Leprosy		2				1	3
Malaria	4	4		1	1	7	17
Measles		20		5	6	5	36
Poliomyelitis					1	3	4
Scarlet fever			2				2
Smallpox		1					1
Tetanus				1			1
Tuberculosis	2	21	29	20	16	19	107
Typhoid fever	8	31	13	16	9	36	113
Undulant fever						3	3
Whooping cough		4	2				6

[1] Includes the city of Habana.

KOREA

Encephalitis, Japanese "B".—Information dated September 7, 1949, states that an outbreak of Japanese "B" encephalitis, not yet in epidemic form, has been reported by the health authorities in Korea. This outbreak is stated to have begun August 26, 1949, at Kaesong, and to have spread to Seoul and south of Seoul. As of September 5, cases and deaths had been reported as follows: Kaesong 110 cases, 51 deaths; other rural areas 46 cases, 17 deaths; Seoul 113 cases, 29 deaths.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January–June 1949	July 1949	August 1949—week ended— 6	13	20	27
ASIA						
Burma	229	11				
Bassein	164	11				
Moulmein	2					
Rangoon	2			[1] 1		
Ceylon:						
Trincomalee	2					
China:						
Amoy		[2] 1				
India	53,390	8,752	1,714	1,108	[3] 394	[3] 377
Allahabad	5			7		
Bombay	[1] 3	[1] 2			[1] 1	
Calcutta	[4] 4,190	321	42	43	47	63

CHOLERA—Continued

Place	January–June 1949	July 1949	August 1949—week ended—			
			6	13	20	27
ASIA—continued						
India—Continued						
Cawnpore	103	25	5	11	14	15
Cocanada		5	4	1	1	
Cuddalore	2					
Lucknow	25	7				
Madras	76	122	39	52	38	21
Masulipatam	1					
Nagpur		1	8	3		
Negapatam	26					
New Delhi	[4] 2	16				
Raj Samand	40					
Tuticorin	14					
India (French):						
Karikal	55					
Pondicherry	100					
Indochina (French):						
Annam	(5)					
Cambodia	42		3			
Cochinchina	10			1		
Pakistan	21,893	818				
Chittagong	71	3	1			
Dacca	92				6	
Lahore	11			[1] 1	2	1
Siam (Thailand)	9					
Bangkok	8					

[1] Imported. [2] Suspected. [3] Preliminary figures. [4] Includes imported cases. [5] Correction: The 53 cases of cholera reported in Annam (Pub. Health Rep., May 27, 1949, p. 681, June 24, 1949, p. 812, July 29, 1949, p. 956) were erroneously recorded. These were cases of plague. No case of cholera has been reported in Annam this year. The plague figures have been corrected accordingly.

PLAGUE •

(Cases)

Place	January–June 1949	July 1949	Aug. 6	Aug. 13	Aug. 20	Aug. 27
AFRICA						
Basutoland	40	1				
Belgian Congo	7	[1] 5		1	1	
Costermansville Province	1	1			1	
Stanleyville Province	6	[1] 4		1		
British East Africa:						
Kenya	4	1				
Tanganyika	15					
Madagascar	66	4				
Tananarive	3					
Rhodesia, Northern	2					
Union of South Africa	[2] 36	[2] 26	2	[2] 3		
ASIA						
Burma	[3] 410	7		1		
Mandalay	1					
Moulmein	[3] 6					
Rangoon	[3] 6	1		1		
China:						
Chekiang Province	7					
Wenchow	7					
Fukien Province	20					
Kiangsi Province	9					
India	24,680	779	154	163		
Indochina (French)	88			1	2	
Annam	[4] 63				2	1
Cambodia	20			1	1	
Cochinchina	31					1
Laos	3					
Java	31	2				
Siam (Thailand)	152			3		
EUROPE						
Portugal: Azores	4					
SOUTH AMERICA						
Peru:						
Lambayeque Department	7					
Lima Department	3					
Piura Department	6					

PLAGUE—Continued

Place	January–June 1949	July 1949	August 1949—week ended—			
			6	13	20	27
SOUTH AMERICA—continued						
Venezuela:						
Aragua State	2					
OCEANIA						
Hawaii Territory: Plague infected rats [5]						

*During the period July 23–Aug. 6, 1949, 2 cases of bubonic plague were reported in the State of New Mexico in the United States—1 case in Taos County and 1 case in Sandoval County.

[1] Includes 2 cases of pneumonic plague. [2] Includes suspected cases. [3] Includes imported cases. [4] Corrected figure. (See footnote 5 in Cholera table p. 1242). [5] Plague infection has been reported in Hawaii Territory as follows: On Mar. 12, 1949, in a mass inoculation of 2 pools of tissue from 10 rats (8 and 2), taken on Maui Island; on Mar. 16, 1949, in mass inoculation of 3 pools of 29 fleas (7, 12, and 10) from rats trapped on the Island of Hawaii; on Aug. 4, 1949 in mass inoculation of 15 fleas from rats trapped on the Island of Hawaii; on Aug. 18, 1949, in a pool of 31 fleas collected from rats trapped on the Island of Hawaii.

SMALLPOX

(Cases)

(P=present)

Place	January–June 1949	July 1949	Aug. 6	Aug. 13	Aug. 20	Aug. 27
AFRICA						
Algeria	143	17				
Angola	[1] 327					
Belgian Congo	[1] 1,035	282	67			
British East Africa:						
Kenya	24		1			
Nyasaland	926	50				
Tanganyika	374					
Uganda	33					
Cameroon (British)	10	10				
Cameroon (French)	61	3				
Dahomey	270	27		[2] 18	[3] 15	
Egypt	3					
Eritrea	1					
Ethiopia	6					
French Equatorial Africa	69	18		[2] 40		
French Guiana	1					
French West Africa: Haute Volta	108	11				
Gambia	54	4				
Gold Coast	17					
Ivory Coast	211	40		[2] 1	[3] 1	
Morocco (French)	8					
Mozambique	127	44	1			
Nigeria	6,681	128				
Niger Territory	412	9		[2] 28		
Portuguese Guinea	1					
Rhodesia:						
Northern	5			1		
Southern	276	124				
Senegal	16	1				
Sierra Leone	107					
Sudan (Anglo-Egyptian)	[1 4] 131	39	5	3	18	
Sudan (French)	152	2		[2] 1		
Togo (French)	104	28				
Union of South Africa	353	18	[5] 3	[5] 2	[5] 1	
ASIA						
Afghanistan	87	57				
Arabia	[4] 38	[5] 3				[6] 2
Bahrein Islands	[4] 46	8	1			
Burma	[4] 1,442	[4] 53	3	12		10
Ceylon	[6] 1		[6] 1			
China	889	22				
India	54,147	4,831	656	325	[7] 107	[7] 107
India (French): Yanaon	1					
India (Portuguese)	205	11				
Indochina (French)	2,235	93	3	2	5	5
Iran	224	14				
Iraq	[4] 360	48	2	4	[4] 10	3
Israel	5					
Japan	117	6				

SMALLPOX—Continued

Place	January–June 1949	July 1949	August 1949—week ended— 6	13	20	27
ASIA—continued						
Korea (Southern)	544					
Lebanon	[4] 139					
Malay States (Federated)	43					
Manchuria		9				
Netherlands Indies:						
Java	5,523	1,774	326	415	222	
Riouw Archipelago	2					
Sumatra	[4] 94	[4] 33	9	10	8	11
Pakistan	3,201	215				
Philippine Islands:						
Mindoro Island	11					
Romblon Island	[6] 4					
Tablas Island	2					
Portuguese Timor	4					
Siam (Thailand)	37		6			2
Straits Settlements: Singapore	[4] 2					2
Syria	357	50	5	3	14	14
Transjordan	184	7	2			
Turkey. (See Turkey in Europe)						
EUROPE						
Belgium	1					
Germany		1				
Great Britain: England and Wales	[4] 20					
Italy	[8] 98					
Portugal	5	2				
Spain	2					
Canary Islands	6					
Turkey	89	3				
NORTH AMERICA						
Cuba: Habana	[4] 6					
Guatemala	4					
Mexico	44	[9] 1				
SOUTH AMERICA						
Argentina	[1] 72	[1] 28	[1] 26	[9] 1	[9] 8	[9] 20
Bolivia	35					
Brazil	[1] 73	[9] 6	[9] 2	[9] 3	[9] 4	[9] 2
Chile	[6] 2					
Colombia	[1] 1,646	[9] 159				
Ecuador	[1] 501	[1] 37				
Paraguay	[9] 2					
Peru	1,151					
Venezuela	[1] 1,306	[1] 23				
OCEANIA						
Guam	2					

[1] Includes alastrim. [2] Aug. 1–10, 1949. [3] Aug. 11–20, 1949. [4] Includes imported cases. [5] In Johannesburg. [6] Imported. [7] Preliminary figures. [8] Includes 95 cases of varioloid reported in Rome Jan. 1–June 10, 1949. [9] Alastrim.

TYPHUS FEVER*

(Cases)

(P=present)

Place	January–June 1949	July 1949	August 1949—week ended— 6	13	20	27
AFRICA						
Algeria	47	9				
Basutoland	7	2				
Belgian Congo	[1] 41					
British East Africa:						
Kenya	68					
Nyasaland	4					
Tanganyika		1				
Egypt	171	3	1			
Eritrea	50	12				
Ethiopia	404					
Gold Coast	1					
Libya	187	10	6			2
Madagascar: Tananarive	[1] 10					

TYPHUS FEVER—Continued

Place	January-June 1949	July 1949	August 1949—week ended—			
			6	13	20	27
AFRICA—continued						
Morocco (French)	14	2				
Morocco (Spanish)	2					
Sierra Leone	[1] 1					
Tunisia	57	4				
Union of South Africa	[2] 62	P	P			
ASIA						
Afghanistan	1,477	(3)				
Arabia: Aden	[4] 2					
Burma	4					
Ceylon: Colombo	[1] 4	[1] 1				
China	25	2				
India	[4] 225	4				
India (Portuguese)	19	1				
Indochina (French)	10					1
Iran	140	4				
Iraq	29	12	1	4	4	
Japan	84	9				
Korea	142					
Lebanon	[1] 1		[1] 1			
Pakistan	589					
Palestine	[5] 100					
Philippine Islands: Manila	[1] 1					
Straits Settlements: Singapore	[6] 2					
Syria	20	1	1			
Transjordan	53	5			1	
Turkey. (See Turkey in Europe.)						
EUROPE						
Belgium	[4] 5					
Bulgaria	345	19				
Czechoslovakia	20			24		
France	4					
Great Britain: Island of Malta	[1] 4	[1] 1		[1] 1		
Greece	[2] 31	[2] 2		[1] 2		
Hungary	20					
Italy	[2] 29		4			
Sicily	13					
Poland	228	15	9			
Portugal	5					
Rumania	417					
Spain	3					
Turkey	122	14	4	2	2	5
Yugoslavia	156	3	5			
NORTH AMERICA						
Bahama Islands: Nassau	[1] 1					
Costa Rica [1]	22	1			2	2
Cuba [1]	3					
Guatemala	27					
Jamaica [1]	10	6		1		
Mexico [2]	91	40	7	12	2	4
Panama Canal Zone [1]	6					
Puerto Rico [1]	20	7	1	3		
SOUTH AMERICA						
Argentina [1]	1					
Bolivia	53					
Brazil	2					
Chile [2]	124	18	3	7	1	
Colombia [2]	1,444	223				
Curacao [1]	5					
Ecuador [2]	170	43				
Peru	663					
Venezuela [1]	42	17				
OCEANIA						
Australia [1]	82	6	2			
Hawaii Territory [1]	4	1	1			

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Murine type. [2] Includes murine type. [3] An epidemic of louse-borne typhus fever was reported in Afghanistan on July 22, 1949. [4] Includes imported cases. [5] Approximate number reported in outbreak in villages in Hebron and Bethlehem districts in February 1949. [6] One case type unspecified, 1 case murine type.

YELLOW FEVER

(C=cases; D=deaths)

Place	January—June 1949	July 1949	August 1949—week—ended— 6	13	20	27
AFRICA						
Belgian Congo:						
Stanleyville Province D	5					
French Equatorial Africa:						
Bangui D					1	
Gold Coast C	[1] 4	[1] 10	[2] 1	[2] 2	2	[1] 3
Akwatia C		4		[2] 1		
Brim District C	[2] 2	1				
Komenda Village [3] D	1					
Nkwanta Dunkwa Area D		1				
Oda Area:						
Bawdua C		[2] 1	[2] 1			
Esuboni C		[2] 1				[2] 1
Oseikrome Village D	1					
Winneba Area:						
Apam D					1	
Akukuom D					1	
Nyakrom C		[4] 2		[2,4] 1		[5] 2
Nigeria:						
Lagos D	2					
NORTH AMERICA						
Panama:						
Colon Province D				1		[6] 1
Pacora C	[7] 8					
SOUTH AMERICA						
Brazil:						
Amazonas State D	1					
Para State D	3					
Ecuador:						
Napo Pastaza Province D	1					
Peru:						
Cuzco Department D	2					
San Martin Department D	1					

[1] Includes suspected cases. [2] Suspected. [3] Near seaport of Sekondi. [4] Fatal. [5] 1 suspected case, 1 fatal confirmed case. [6] Case contracted in same jungle area of the Province of Colon as the one reported on August 7, 1949 (see Public Health Reports for September 2, 1949, p. 1132). Death occurred on August 21, 1949, in Saint Tomas Hospital in Panama City. [7] Reported Jan. 15, 1949. Date of occurrence Nov. 11–Dec. 30, 1948. 5 cases, all fatal, confirmed; 3 suspected cases.

DEATHS DURING WEEK ENDED SEPT. 3, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Sept. 3, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,470	10,579
Median for 3 prior years	7,965	
Total deaths, first 35 weeks of year	324,344	327,305
Deaths under 1 year of age	672	741
Median for 3 prior years	682	
Deaths under 1 year of age, first 35 weeks of year	22,955	23,574
Data from industrial insurance companies:		
Policies in force	70,196,573	70,926,141
Number of death claims	11,630	11,333
Death claims for 1,000 policies in force, annual rate	8.6	8.4
Death claims per 1,000 policies, first 35 weeks of year, annual rate	9.3	9.5

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 **OCTOBER 7, 1949** NUMBER 40

TUBERCULOSIS CONTROL ISSUE NO. 44

IN THIS ISSUE

Editorial—Education for Tuberculosis Nursing
Prospectus of Research in Mass BCG Vaccination
Tuberculosis Mortality Relationships—1947
Tuberculosis and Its Control in Rural Areas

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

CONTENTS

	Page
Editorial—Education for tuberculosis nursing. Robt. J. Anderson	1247
Prospectus of research in mass BCG vaccination. Carroll E. Palmer	1250
Tuberculosis mortality relationship—age, race, and sex, 1947	1261
Tuberculosis and its control in rural areas. Milton I. Roemer	1269
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended September 17, 1949	1279
Communicable disease charts	1282
Plague infection in Park County, Colorado	1283
Territories and possessions:	
Hawaii Territory—Plague in fleas	1283
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended August 27, 1949	1283
Finland—Notifiable diseases—July 1949	1284
New Zealand—Notifiable diseases—5 weeks ended July 30, 1949	1284
Poliomyelitis in foreign countries	1284
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Plague	1285
Smallpox	1286
Typhus fever	1286
Yellow fever	1286
Deaths during week ended September 10, 1949	1286

Public Health Reports

Vol. 64 • OCTOBER 7, 1949 • *No. 40*

—Editorial—

Education for Tuberculosis Nursing

The new Instructional Plan for Basic Tuberculosis Nursing, published in July of this year by the National League of Nursing Education, is an imaginative attack upon one of the most difficult problems associated with tuberculosis control—the deficit of professional tuberculosis nurses.

An article in the August issue of PUBLIC HEALTH REPORTS pointed out that tuberculosis hospitals in the United States are understaffed. At the present time many hospitals are forced to make up the deficiencies in trained professional nurses by using untrained workers and volunteers. Sometimes the standard of patient care falls because there are not enough hands to do all the day-in-day-out work that is necessary. One of the basic reasons for the deficit, according to the article, is that many schools of nursing up to now have given little instruction in tuberculosis and even less clinical experience.

The National League of Nursing Education has always believed that the public holds each profession responsible . . . "for determining what educational standards and programs are necessary for the proper selection and preparation of its members . . ." They have issued the new Instructional Plan as the statement of the profession itself in an effort to give tuberculosis nursing a place in the curriculum commensurate with the importance of the disease as a killer and waster of human lives.

The 1937 Curriculum Guide issued by the National League of Nursing Education devoted only three paragraphs to tuberculosis. Under the heading, Nursing in Communicable Disease, it recommended 15 hours of instruction devoted chiefly to the pathology and treatment of tuberculosis.

The new Plan is much more detailed and specific. The recommended course of study is from 45 to 60 hours depending upon previous instruction, with 180 to 240 hours of practice. It is divided into

This is the forty-fourth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear in the first week of each month. The series began with the March 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1 00 per year, $1.25 foreign.

eight units, beginning with orientation to acquaint the student with the similarities and differences between tuberculosis nursing and other kinds of nursing. It continues with a unit called The Nature of Tuberculosis which presents a brief history of the disease, its etiology, microbiology and method of transmission, the body's reaction to an invasion of the bacilli and complications and co-existent conditions and diseases.

The third unit is devoted to socioeconomic factors associated with tuberculosis. It suggests a study of epidemiology; of the various facilities for diagnosis such as hospitals, clinics and health services; and of the functions of national and local tuberculosis associations. It also contains a detailed discussion of welfare agencies, both official and unofficial, and of legislation on residence requirements, isolation of patients, compensation, case reporting and the means test. In this section, instruction in health education is also recommended.

The next unit deals with prevention and includes, after a brief emphasis upon the maintenance of positive health, intensive instruction in case-finding methods, differential diagnosis, classification of cases, and immunization. The role of the nurse in each of these activities is discussed and her part in educating both the patient and his family about health and disease is stressed.

Personal and psychological factors affecting recovery are the subject of the fifth unit. The student nurse is to be given preparation for dealing with a patient's reaction to the diagnosis of tuberculosis and the personal problems that arise in the course of diagnosis and treatment. Special attention is given to the subject of developing satisfactory relationships between nurse and patient.

Only after these highly important considerations have been impressed upon the student, does the plan call for training in strictly medical and surgical procedures. Even in this part of the course the comfort and well-being of the individual patient is kept constantly in the foreground.

The last unit of instruction is rehabilitation, and here again emphasis is placed not only upon technicalities such as referrals and official rehabilitation aids, but also upon the welfare of the patient himself.

Such a course of study will train nurses who can make an invaluable contribution to the care of tuberculous patients. The next step, of course, is to get the plan adopted by as many schools as possible. In the past the recommendations of the National League of Nursing Education have carried great weight among school administrators, supervisors and head nurses, some 4,000 of whom are members of the League. In all probability there will be equal willingness to carry out the present recommendations.

School directors are reluctant, however, to place their students on tuberculosis services unless they can be protected against infection.

The practice of aseptic techniques is imperative for the protection of everyone who comes in contact with the disease. Both in the nursing schools and on tuberculosis services a health program with repeated tuberculin, X-ray, and general examinations should be maintained for all student nurses and other personnel throughout their training. Proper personal hygiene must be reinforced by good nutrition and good living conditions. Patients must be segregated, and vigilance against the spread of bacilli must never be relaxed with open cases of tuberculosis. Such a program is an essential correlative of the new Instructional Plan.

The National League of Nursing Education Committee on Curriculum has recognized the need for a plan to incorporate experience in tuberculosis nursing into the curriculum of basic nursing education. They are offering the profession the well-formulated plan by the Joint Tuberculosis Nursing Advisory Service as a workable one which stands a chance of meeting this need. Admittedly, there will be difficulties in putting the plan into operation. However, it would seem that there are none that cannot be resolved if the schools of nursing, tuberculosis sanatoria, and hospital administrators in general hospitals recognize the benefits to be obtained. Sanatoria and tuberculosis services in general hospitals will be able to draw upon an increasing number of nurses thoroughly grounded in tuberculosis. As they do so, many of the onerous conditions which have been caused by the deficit of nurses can be alleviated, and a long step will be taken toward providing better care for tuberculous patients and more positive assistance from nurses in the entire tuberculosis control program.

ROBT. J. ANDERSON, *Medical Director,*
Chief, Division of Tuberculosis.

Prospectus of Research in Mass BCG Vaccination

By Carroll E. Palmer, M. D.*

The antituberculosis mass vaccination program of the Joint Enterprise[1] offers an almost unparalleled opportunity to study tuberculosis on a world-wide basis. At various times during the planning of the program, suggestions have been made to take full advantage of this opportunity, and at present a beginning has been made in this direction. In general, however, emphasis has been laid primarily on a relatively few statistical studies. To limit the program to such studies is to neglect the chance to make major contributions to the whole broad field of tuberculosis. The tuberculin testing and vaccination program should be viewed as offering a tremendous facility for medical research.

In considering an extensive medical research program, two basic facts should be recognized:

First, it must be admitted in clear and unequivocal terms that strict scientific proof of the effectiveness of BCG vaccination in the control of human tuberculosis is not available. This is true despite the fact that millions of persons have been given BCG during the past 20 years and despite the very suggestive evidence of a few, small scale studies. It may still be true 20 years from now, unless an energetic and careful evaluation of the effects of BCG programs are undertaken.

Second, it must be realized that a major responsibility for studying the effects of the program will fall upon national and local groups. An international research organization can only advise and assist in a long range program of evaluation and research.

As viewed here, the medical research program of the Joint Enterprise may be classified under three major headings:

1. Research on the details of techniques, procedures, and results of tuberculin testing and immunization.
2. Basic epidemiological research on tuberculosis infection and disease.
3. Evaluations of the BCG program in the prevention of tuberculosis morbidity and mortality.

It should be recognized that it is neither necessary nor desirable to set up entirely separate studies on these three aspects of the research program. On the contrary, the research work should operate as a

*Medical director, Field Studies Branch, Division of Tuberculosis, Public Health Service. Presented to the Joint World Health Organization/United Nations International Children's Emergency Fund Committee and to the Executive Board of the World Health Organization, October-November 1948.

[1] A cooperative effort between the United Nations International Children's Emergency Fund, the Scandinavian voluntary organizations (Danish Red Cross, Norwegian Help for Europe and Swedish Red Cross) and the World Health Organization.

coordinated whole, each project being designed to contribute as much as possible to all of the research objectives. Further, it is recognized that the investigative aspects of the program must be so integrated into the service program as not unduly to disturb the main objective of actually testing and vaccinating as many persons as possible. Most careful planning of the research program, both of the field work and of the statistical analysis, is therefore necessary.

The present prospectus for medical research for the Joint Enterprise represents mainly an attempt to set down examples of the type of investigations that are needed and should be done as an integral part of the service program.

Selecting Persons for Vaccination

One of the most pressing problems that require further study in connection with the practical aspects of the Joint Enterprise program concerns criteria for selecting persons for vaccination. At the present time several different products are being used, by several different methods and combinations of methods. Also, the rules have recently been changed to use 10 rather than 33 or 100 TE[2] for the final Mantoux test. There is in practice considerable variation in the way all of this is being carried out. It should be admitted, furthermore, that there is not general agreement on just what degree of tuberculin sensitivity should be used to separate persons into those needing and those not needing vaccination. In addition, it is not known whether the criteria for selecting persons for vaccination should be varied with age, tuberculinization of the population, country or nationality groups. Lack of uniformity in this part of the work makes it very difficult to obtain full use of the statistical tabulations being prepared. For these reasons it is essential, at once, to undertake certain studies which may be expected to furnish more conclusive evidence regarding precise as well as practical methods for managing the prevaccination testing.

In order to get information on this problem a number of separate projects should be undertaken. All of them, however, involve very difficult, fundamental studies on the specificity of the tuberculin test but much information of practical value may be obtained if arrangements can be made in the routine service program for doing duplicate tests, using different tuberculin products and different methods of application.

Allergy-producing Characteristics of Vaccines and Their Administration

Vaccination programs for tuberculosis in some parts of the world are not likely to be successful until a preserved vaccine is developed

[2] Tuberculin unit.1/50,000 mg. standard PPD=1/100 mg. standard Old Tuberculin.

which is satisfactory in producing a high level of allergy and which causes relatively few complications from the vaccination. A number of preserved BCG and other products are available for trial now, and others are being developed. Further, there is at this time considerable disagreement on the adequacy of different BCG vaccines, and as well on methods of giving the vaccine. One of the most urgent parts of the research program for the Joint Enterprise, therefore, should be to set up studies to determine the allergy producing qualities of different vaccines, both fresh and preserved, on the different methods of giving the vaccines; and on complications of the vaccination reactions.

Intensive studies along this line are already going forward in the pilot studies in Paris and in the United States, the results of which can be used as guides for some of this work. It is evident, however, that this work can be considered only as relatively small pilot investigations and that large-scale studies should be made a part of the Joint Enterprise research program. It must be recognized that investigation on this subject would consist of several separate field projects, each involved with the comparison of two or more vaccines or methods.

Essential features of these projects are as follows:

1. Prevaccination tuberculin testing according to standard, uniform procedures.

2. Separation of the persons to be vaccinated, by a purely chance selection scheme, into two or more comparable groups, each group to receive a different vaccine, or vaccine given by a different method.

3. Postvaccination tuberculin testing according to standard procedures, at suitable intervals, to determine the level of tuberculin sensitivity attained.

4. Periodic observation of the vaccinated persons for 6 months to 1 year to determine the types and frequencies of complications of the vaccination.

It probably should be mentioned that the essential objective of these studies is limited to a determination of the allergy producing qualities of the different vaccines and the different methods of giving them, under the assumption that the best vaccine and method are the ones which produce the highest degree of allergy for the longest period of time. Such an assumption may or may not be warranted, and conclusions drawn from the studies should take this into account.

Effect of Revaccination

Although knowledge of the value of BCG vaccination is believed sufficient for the present practical program, there can be no doubt that knowledge of the effect and value of revaccination is almost completely lacking. One of the critical problems which faces the

Joint Enterprise, in its work at present and certainly for the future, is therefore to obtain as much information as is possible on a long list of questions which may be raised about revaccination. Areas or communities must be found where long-range extensive projects on this subject may be undertaken.

Project on the Effect of Vaccinations Without Revaccination. The essentially critical points in these projects involve the follow-up study of morbidity and mortality in large population groups, where it is possible to make systematic and repeated postvaccination tuberculin tests and where revaccination is not done. The general plan is as follows: The routine service program of tuberculin testing and vaccination would be carried out in the study areas. Postvaccination tuberculin tests, on all vaccinated cases, would then be done at 6–8 weeks, 6 months, 1 year, 2 years, 3 years, and 4–5 years after vaccination. *Regardless of the results of these tuberculin tests, revaccination must not be done.* During the 4–5 year period following vaccination, an efficient, well-worked-out plan must operate for collecting records on all cases and deaths from tuberculosis among the part of the population that was vaccinated.

Results of these studies would be expressed in relatively simple terms: the frequency or rates of tuberculosis morbidity and mortality among different groups of the vaccinated population separated according to the degree and duration of allergy produced by one vaccination. The main objective of the study is thus to determine whether or not there is a difference in the protection afforded by BCG, which can be related to allergy and, therefore, to the need and probable value of revaccination. If, at the same time, morbidity and mortality rates are obtained for the tuberculin-positive members of the vaccinated segment of the population, valuable information would also be obtained to study the differences between natural and artificially produced allergy.

It should be recognized that the results of such a study as this may not be interpreted as a strictly scientific evaluation of the effectiveness of BCG. Thus it may be argued that the classification of individuals according to the degree and duration of allergy following BCG serves only to classify individuals into groups according to their inherent or natural resistance or susceptibility to tuberculosis. That such a differential classification of a population is possible would be of great practical value in our knowledge of tuberculosis.

While it is not possible to argue a priori that such a study would furnish no rigorous proof of the value of BCG, it is quite possible that the results would give extremely valuable presumptive evidence on the effectiveness of BCG. For example, if it were found that nearly all cases of the disease and deaths among the vaccinated occurred in a relatively small group that did not develop a strong allergy after

vaccination, it might become immediately practical to introduce a strong program of revaccination. Further, depending on the actual rates of morbidity and mortality found for the different groups defined according to the levels of allergy which develop following a single vaccination, it may be possible to draw significant inferences regarding the value of BCG.

Projects on the Effects of Multiple Revaccination on Allergy. The importance of obtaining information on questions of revaccination, especially in connection with future work by the Joint Enterprise and by local tuberculosis control programs during the next few years, makes it undesirable to wait for the results of the first projects before undertaking certain others.

First, a relatively small scale, very intensive study should be done at once to obtain details of the effects of revaccination on allergy. The critical aspects of the project involve standard testing and vaccination, followed in 6–8 weeks by revaccination of all who have not attained a high degree of allergy, with a repetition of the revaccination again in 6–8 weeks for those who still are not highly allergic. The results of this project should furnish details on the relationship between repeated vaccinations and attained allergy, the dangers and complications of revaccination, the percentage of individuals who repeatedly do not develop allergy.

Projects on the Effects of Multiple Revaccination on Tuberculosis Disease and Mortality. As soon as the results of the above study are available, a large scale project should be undertaken which involves routine testing and vaccination followed by repeated tuberculin testing and revaccinations until the whole group of vaccinated are made highly allergic to tuberculin. At the same time follow-up procedures would be undertaken to collect data for a 4–5-year period on the morbidity and mortality of the vaccinated population. If current theories on the effectiveness of BCG are correct, practically no disease or deaths due to tuberculosis should appear among the vaccinated. This project represents one of the most significant that can be undertaken as part of a purely service program in which it is impossible to have a comparable group of unvaccinated "controls." It should be easily possible to obtain cooperation for such programs, set up in several areas or communities, since they can be considered as superlative demonstrations of the preventive potentialities of BCG. The chief difficulty of such programs is to find sufficiently stable areas in which adequate follow-up of tuberculosis morbidity and mortality can be obtained for a number of years. The chief advantage of such studies lies in the fact that they may show that complete protection against tuberculosis is achieved if all the vaccinated attain a high degree of allergy to tuberculin.

Rates of Tuberculous Infection

The present plan to obtain filled out records of tuberculin tests and vaccinations for local communities offers the opportunity for a wide variety of epidemiological studies. One of the first that should be undertaken is to obtain estimates of the rates at which children are becoming infected with the tubercle bacillus. It is proposed to do this by estimating the average annual rates of infection for children between the ages of 6 and 14 years in the different areas where the work is being done. From the data now available, it seems likely that reasonably accurate estimates of the annual infection rate can be obtained without any substantial modification of the present working and reporting arrangements. The actual estimation of the rates would require a considerable amount of statistical calculations, but the work would not be excessive. The reason for limiting the rates to the age group, 6–14 years, is that figures below 6 and above 14 are not generally extensive. Below 6 years there is considerable selection of the population and the groups cannot usually be considered representative of the general population. Above 14, the percentage of positive reactions is, in many places, too high to make such single rates very satisfactory. For this, and for any other use to be made of the material from the records, it must be realized that the accuracy of the original material is of great importance. Also the uniformity of the field work bears directly on the use of the records. Variations in materials used for testing and in testing procedures will directly affect the use and value of the statistics.

Average annual infection rates for school children may be the best single index of tuberculosis we can obtain for many countries today, since morbidity and mortality rates are not very reliable. Rates for children 6–14 years of age include children born between 1934 and 1942, and will reflect a very wide range of conditions existing before, during, and after the war. On the whole, however, such rates ought to furnish a fair index of the frequency of effective contact with the tubercle bacillus. In many places the rates would mainly represent "familial" or "home" contacts with open cases of tuberculosis. However, in interpreting the results, attention will have to be directed to the possible role of bovine tuberculosis.

It may be anticipated that accurate yearly infection rates for different countries and local areas will be of great value both immediately and in the future. Also, the present moment will be the last chance to obtain such rates for a long time to come. In this connection it should be remembered that the present BCG program is about to destroy the much discussed value of the tuberculin test as an epidemiological index of tuberculosis. For this reason alone, it would seem justifiable to expend a fair amount of energy to document the program in this

way, and perhaps be able to defend it against unwarranted criticism in the future.

For immediate practical purposes, annual infection rates for school children may be used in a purely descriptive way to show the differences which exist today in the status of tuberculosis in various countries and their subdivisions, and to do so in a far more accurate way than has ever before been possible. For many countries, an accurate comparative description in these terms may be made the foundation for future tuberculosis control programs. As such, the descriptions may transcend in usefulness the cruder, less accurate, and more complex tuberculosis mortality rates. In this connection, it should be recognized that annual tuberculosis infection rates have not been used before simply because they were never actually available with sufficient coverage to make them useful, and that they would not become available now except for the well-controlled BCG vaccination program.

With respect to other uses of well-determined infection rates for school children, it must suffice here simply to give one illustration.

One of the problems which will eventually face the Joint Enterprise and also the individual countries in the program will be to evaluate the effect that the vaccination has had on tuberculosis morbidity and mortality. In doing this, however, it will be necessary to take account of many factors which influence deaths from tuberculosis. Accurate knowledge of the infection rates for children before they are vaccinated will constitute one of the most important of such factors. Details of the exact way in which the infection rates can be used will need to be studied, but it must be evident that the long-range effect of a vaccination program is dependent not only on the proportions of uninfected persons who were vaccinated, but also on some measure or index of how much contact these persons were probably subjected to before and after vaccination.

Effectiveness of BCG Vaccination

Indirect Studies. While it is true that direct evidence on the specific value of BCG as a preventive of tuberculosis can be derived only from strict scientific studies involving randomly selected unvaccinated "controls," it should be possible to utilize the vast experience of the Joint Enterprise to obtain presumptive evidence on this question. One of the questions often posed in this connection is that persons who refused to be vaccinated can be followed up, along with the vaccinated, and that the value of BCG can be determined by comparing mortality rates among the vaccinated with those of the group which refused. The answer usually given to the question is that this procedure is entirely unsatisfactory; that one can learn nothing from such studies. This is not necessarily true.

By the addition of a relatively few observations it should be possible to get information on important differences between the group that accepts, and the one that refuses vaccination. From this information it should be possible to judge something of the comparability of the two groups and to what extent comparison between them would be justifiable.

For example, relatively accurate data on "history of contact with tuberculosis," preferably obtained from the parents of each child, could be used to determine whether the vaccinated and "refused" groups are comparable with respect to the likelihood of past and future exposure to the disease. In the same way and for certain other purposes, information on whether or not a member of the family had died of tuberculosis could be used. A very brief review of this type of information, made in Germany in June, indicated that the groups who accept vaccination contain a far greater percentage of persons with a history of contact than the group that refuses. If this finding could be established as fact, and later it were found that a much higher frequency of disease and deaths occurred among the nonvaccinated, it could be argued that in spite of a higher rate of exposure to tuberculosis, in the past and probably in the future, BCG had contributed to the reduction of the disease among the vaccinated. Very strong presumptive evidence of the value of BCG would accrue if the rate of disease and deaths from tuberculosis among the vaccinated were only a very small fraction of the rate among the tuberculin-negative nonvaccinated.

Another simple way of gaining information on the comparability of the vaccinated and nonvaccinated groups would be to ask, before the first tuberculin test is given, whether or not permission to vaccinate would be granted by the parents. With this information available, it could be determined whether there is a difference in the frequency of positive tuberculin reactors among the two groups of the population, the one where the parents accept, the other where the parents reject vaccination.

The collection of data such as these, and others, should be carefully considered as possible additions to the present program in those countries or subdivisions where a significant proportion of the population do not favor vaccination. By so doing it may be possible to capitalize on otherwise undesirable situations to serve the extremely important purpose of adding to our knowledge of the usefulness of BCG. In considering this matter, however, it must be remembered that to make the material fully useful would require the most careful kind of long-term follow-up of individuals in the population, those vaccinated and those not. At a minimum, this would entail keeping, for a number of years, the file of vaccination record cards against which

deaths from tuberculosis are periodically matched. In order not to destroy the value of the investigation, it would be necessary, also, that no further vaccination program be undertaken in the community. This, obviously, may be a difficult and undesirable complication, but it is not apparent how it can be avoided—unvaccinated "controls" in this project, as in any other, means what it says. Unless there can be agreement on this point, it is foolish to spend time and energy on such a study.

Direct Studies. At the time of the subcommittee meeting in Paris in June, the problem of strictly scientific control studies involving comparable groups of randomly-selected-unvaccinated "controls," was discussed. The consensus of that discussion was that such studies are impossible in the present Joint Enterprise program. The importance of the matter, however, would certainly seem to justify its reconsideration. No further comments will be made here, except to state that some way must be found to carry out such studies in some place, and soon.

Miscellaneous Studies and Projects

In addition to the investigations already suggested, there are many others that should be carefully considered. Among these are some which may be viewed as having only academic or theoretical interest; others consist merely of suggestions regarding the collection and handling of the records in such ways as to make them more readily usable for a wider variety of studies; still others involve projects designed to obtain information not only of use in tuberculosis control but also conceived as contributions to the broader aspects of epidemiology and public health in general.

Studies on Familial Characteristics of Tuberculin Sensitivity. From the long history of the study of tuberculosis, it is clear that the primary factor in the spread of the disease is personal contact with an infectious case. On the other hand, there is recurring evidence that familial characteristics or hereditary and racial factors also play some role in the disease. Records now being collected in the BCG campaign offer a remarkable opportunity to study certain aspects of this problem and one specific project is suggested to illustrate what can be done. The objective of this project would be to determine whether or not there are familial similarities in the capacity to become allergic to tuberculin, and whether these similarities are in any way related to a tendency to develop the disease or die from it.

In order to study this question in a preliminary way, it would be necessary, in addition to items now being observed, to collect information which would allow the grouping of children into family aggregates, and to collect information on the history of tuberculosis disease

and death in the family. In certain localities, therefore, a special record card could be used which would call for the mother's and father's name, and answers to a few questions on history of tuberculosis. Grouping the cards for children in the same family would furnish material on prevaccination tuberculin sensitivity (naturally acquired sensitivity) postvaccination sensitivity (artificially produced sensitivity) and familial response to disease. The statistical analysis of these records would be rather complex but quite feasible, and should furnish important information on questions of familial resistance and susceptibility to tuberculosis. Obviously there are many additions and ramifications of such investigations which should be carefully considered and undertaken. To fail to do so is to miss some of the rare opportunities for fundamental research which the work of the Joint Enterprise has to offer.

Studies on Histoplasmin Sensitivity and Histoplasmosis. During the last few years in the United States, evidence has been brought out that *Histoplasma capsulatum* (or a closely related fungus) causes not only a few rare cases of fatal histoplasmosis, but also a mild subclinical disease which in may ways so closely resembles subclinical tuberculosis as to be frequently confused with it. Although fatal histoplasmosis is thought to be world-wide in its distribution, almost nothing is known outside the United States regarding the mild subclinical form. It is suggested, therefore, that the intradermal skin test with histoplasmin be widely used on a small sampling basis in all countries where the BCG work is being done. The extra work in investigating this problem would be almost negligible. Histoplasmin for the tests can be supplied from America. The only difficulty in the work involves finding representative schools in a few areas in each country where no objection could be raised to doing duplicate tests, one intradermal histoplasmin test along with the tuberculin test done for BCG. At least 100,000 tests in the United States can be cited for evidence that the histoplasmin test is harmless.

The objective of these preliminary studies is, of course, simply to determine whether sensitivity to histoplasmin exists in any of the areas where the vaccination program is being carried out.

Preservation and Handling of Records. The magnitude and importance of the present BCG campaign makes it imperative to document the program in the most careful and complete way. Obviously, no one can say with assurance at this stage of the work, just what information about the program will be needed in the future. Accordingly, careful plans should be made now to preserve intact some of the original cards and records of the program. At present, plans are that the original cards will be held for the use of local communities. While it is essential that all possible use be made of the records in this way, it is quite necessary that provision be made for the permanent preserva-

tion of representative samples of the original records for a number of whole communities in each country. The handling of this problem should be the duty and responsibility of persons who fully appreciate the importance of the matter and who quite completely understand the value and management of large record files. It is naive to believe that present arrangements for the preservation of the original records will be satisfactory for future studies except in rare instances. Details of this work must be studied, but the specific suggestion is made that microfilm copies be made of all the records for several large communities, and that these be stored separately in a safe place, perhaps in the archives of WHO.

Studies of Tuberculosis Mortality Data. It seems inevitable that sooner or later most countries in the BCG program will want to measure the effect of the vaccination work in terms of changes in tuberculosis mortality. To a great extent this type of work will probably be of prime importance to the individual countries and much of the work will necessarily fall upon the local vital statistics offices, although attempts to measure the effect of the program as a whole will be desirable as an activity of an international group or organization.

Preparations for this work should be started as soon as practicable. A statistician familiar with the management of vital records and with the objectives of this special work should visit each country and discuss the problems with the local persons responsible for vital statistics. To the extent that it is feasible to do so, uniform systems should then be started, not only to collect mortality data in the future but also to obtain the best possible material available on the current status of tuberculosis mortality in each country. In addition, it would be desirable to consider ways and means of obtaining data on morbidity. Questions of nomenclature and classifications are of great importance in all of this work, and it may be anticipated that assistance in the handling of these matters can be obtained from international organizations and committees.

At the time of visits of the statisticians to the various countries, the opportunities for, and difficulties of, doing long-time follow-up studies should be thoroughly explored.

Studies on Comparative Findings of Tuberculin Tests and X-ray Examinations. From individual observers in different parts of the world, reports are available of the frequency of abnormal X-ray findings in specific groups of the population, and descriptive material on what these changes are. However, data on X-ray changes and their relationship to tuberculin sensitivity are very limited, and because of the variation in methods used for the determination of tuberculin sensitivity, and in the interpretation of the X-ray film, only a very incomplete picture is at present available on the subject.

During the course of the prevaccination tuberculin testing of the

different population groups in different parts of the world, an exceptional opportunity for obtaining information on this subject is provided, if, in representative areas of the countries engaged in the BCG vaccination program, a simultaneous X-ray examination of the tested group is made. Moreover, the opportunity to evaluate the frequency and type of X-ray changes observed in different geographic areas, in relation to tuberculin sensitivity, will no longer be possible after a mass vaccination of this scope has taken place. It is important, therefore, that such a project should be included in the research plans of the program now. Of particular interest will be the determination of the relationship of the degree of tuberculinization of the population to the type and frequency of abnormal X-ray findings; of the relationship of such findings to the degree of individual sensitization to tuberculoprotein; and, of the frequency of X-ray changes which may simulate tuberculosis occurring among the tuberculin negative groups of the population.

Such comparative studies in different parts of the world would be of unusual value where individual variations in methods of examination and interpretation of results can be avoided. Such uniformity should be preserved in the interpretation of the X-ray films by using one interpreter, or one group of interpreters for films from all areas.

In addition to the uniform standard tuberculin testing prior to vaccination, such a project would entail only the addition of an X-ray examination of each individual tested and arrangements for the proper identification of each film with its respective survey card.

Tuberculosis Mortality Relationships—Age, Race, and Sex, 1947

Age and Tuberculosis Mortality

The recent shift of tuberculosis mortality toward the older age groups has stimulated a great deal of interest in the relationship between age and tuberculosis mortality. Table 1 and the graphs are presented as a convenient means for studying this relationship for the most recent year of available data.

The data have been divided into two groups: one relating to deaths among persons younger than a given age, and the other relating to deaths at a given age and older. The first part of the tabulation presents death rates for these complementary age groups; the second part, proportionate mortality (tuberculosis deaths per 100 deaths

From the Division of Tuberculosis, Public Health Service.

from all causes); and the third shows the percentage of all tuberculosis deaths falling above or below each given age.

Rates and ratios shown for the groups younger than 100 years and zero years and older are for the United States.

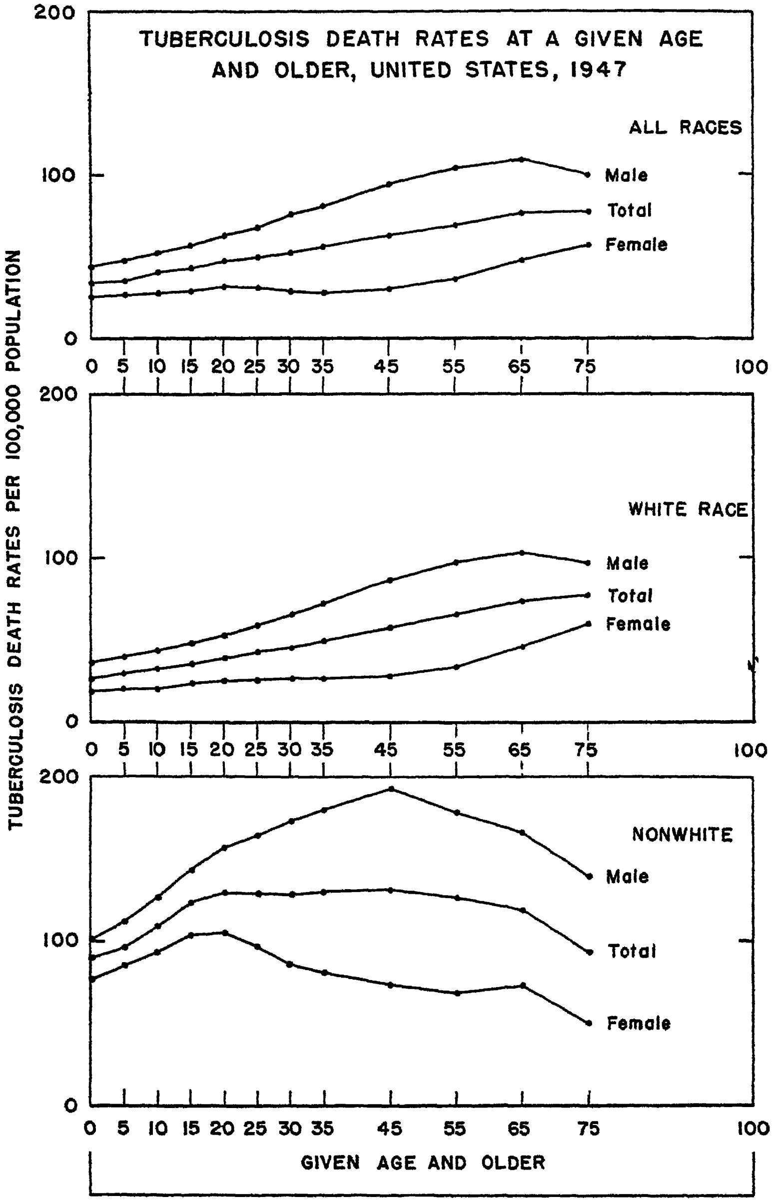

Figure 1.

The bulk of all tuberculosis deaths occur in the older age groups. Thus, 69 percent of the tuberculosis deaths occur at age 35 and over, and 52 percent at age 45 and over.

Note that death rates for those of a given-age-and-older for both the total population and the white race increase as the given age

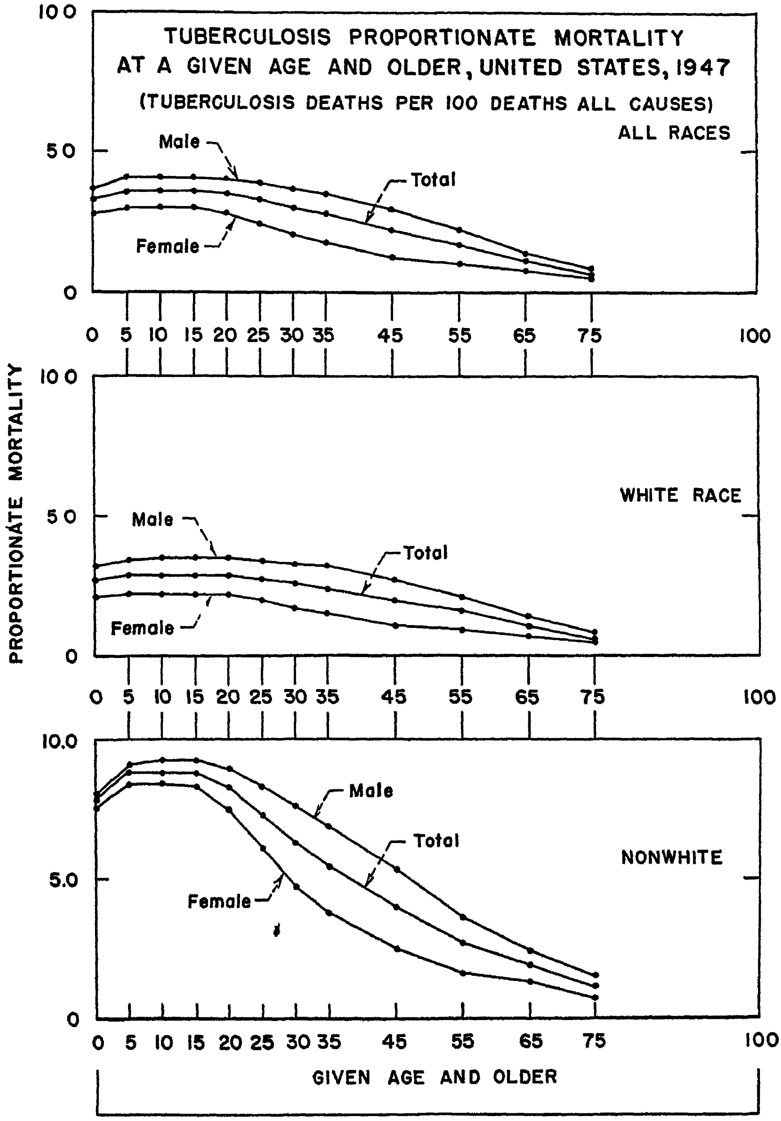

Figure 2.

advances. On the other hand, the rates for nonwhite males show an increase only to the group 45 and older, where a death rate of 190 is reached, after which there is a sharp decline. For nonwhite females, the peak of 105 is reached at age 20 and older and then decreases at later age divisions to a rate below that for all nonwhite females.

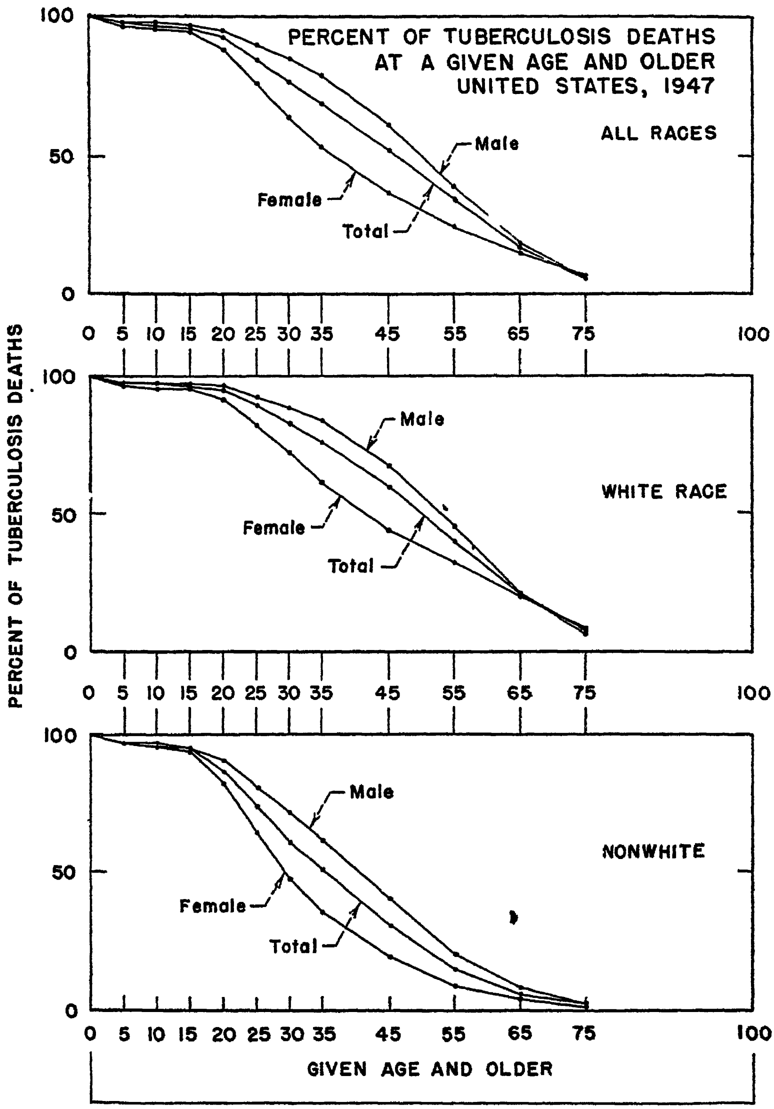

Figure 3.

Table 1. *Tuberculosis All Forms: Selected death rates and ratios by successive complementary age groups for race and sex, United States, 1947*

Given age	All races						White						Nonwhite					
	Total		Male		Female		Total		Male		Female		Total		Male		Female	
	Younger than given age	Given age and older	Younger than given age	Given age and older	Younger than given age	Given age and older	Younger than given age	Given age and older	Younger than given age	Given age and older	Younger than given age	Given age and older	Younger than given age	Given age and older	Younger than given age	Given age and older	Younger than given age	Given age and older
	Tuberculosis death rates per 100,000 population																	
0	------	33.5	------	43.0	------	24.2	------	27.1	------	36.3	------	18.0	------	88.0	------	100.6	------	76.0
5	7.5	36.4	7.8	47.1	7.3	26.0	5.6	29.5	5.7	39.8	5.5	19.3	21.2	96.8	22.9	111.1	19.5	83.3
10	5.0	40.0	5.0	52.0	4.9	28.4	3.6	32.3	3.6	43.8	3.6	21.1	14.1	109.5	14.8	126.2	13.4	93.7
15	4.5	43.7	4.4	57.1	4.7	30.8	3.1	35.3	3.0	48.1	3.1	22.8	14.6	122.2	14.0	142.3	15.2	103.4
20	7.1	46.9	6.0	62.4	8.1	32.1	4.2	38.3	3.7	52.8	4.6	24.3	27.0	129.8	22.2	156.0	31.8	105.4
25	11.7	49.3	9.6	67.8	13.7	31.6	6.7	41.3	5.7	58.3	7.8	24.9	46.4	128.9	37.7	164.2	55.0	96.1
30	15.2	52.0	12.8	73.9	17.6	30.7	9.1	44.6	7.9	64.4	10.3	25.3	59.0	127.8	48.7	173.0	69.0	85.4
35	17.7	55.3	15.7	80.8	19.7	30.3	11.2	48.3	10.1	71.5	12.2	26.0	66.1	129.8	58.0	181.8	73.9	79.9
45	22.3	62.2	23.1	94.2	21.5	30.9	15.3	56.2	16.4	85.8	14.2	27.3	76.3	131.8	75.9	190.8	76.7	73.1
55	26.6	68.9	31.4	103.2	21.9	35.8	19.4	64.8	24.1	97.4	14.8	33.4	83.6	123.9	90.6	177.8	76.9	68.4
65	30.1	76.3	38.0	108.0	22.2	47.3	23.2	73.1	30.9	103.6	15.6	45.5	86.4	119.2	97.1	165.4	76.1	73.2
75	32.5	76.5	41.7	99.8	23.3	56.8	25.9	75.3	34.9	96.7	16.9	57.3	87.9	91.4	99.9	138.9	76.4	50.4
100	33.5	------	43.0	------	24.2	------	27.1	------	36.3	------	18.0	------	88.0	------	100.6	------	76.0	------
	Proportionate mortality (tuberculosis deaths per 100 deaths from all causes)																	
0	------	3.3	------	3.7	------	2.8	------	2.7	------	3.2	------	2.1	------	7.8	------	8.0	------	7.5
5	0.8	3.6	0.7	4.1	0.9	3.0	0.6	2.9	0.6	3.4	0.7	2.2	1.6	8.8	1.5	9.1	1.6	8.4
10	.9	3.6	.8	4.1	1.0	3.0	.7	2.9	.6	3.5	.8	2.2	1.9	8.8	1.8	9.2	2.0	8.4
15	1.1	3.6	.9	4.1	1.3	3.0	.8	2.9	.7	3.5	.9	2.2	2.6	8.8	2.3	9.2	3.0	8.3
20	2.1	3.5	1.5	4.0	2.8	2.8	1.3	2.9	1.0	3.5	1.7	2.2	5.5	8.3	4.1	8.9	7.2	7.5
25	3.8	3.3	2.7	3.9	5.3	2.4	2.3	2.8	1.7	3.4	3.3	2.0	9.7	7.3	7.2	8.3	12.7	6.1
30	5.2	3.0	3.8	3.7	7.2	2.1	3.4	2.6	2.5	3.3	4.8	1.7	12.4	6.3	9.4	7.6	15.9	4.7
35	6.2	2.8	4.8	3.5	8.3	1.8	4.3	2.4	3.3	3.2	5.8	1.5	13.6	5.5	11.0	6.9	16.7	3.8
45	7.2	2.2	6.4	3.0	8.4	1.3	5.5	2.0	5.0	2.7	6.4	1.1	13.6	4.0	12.5	5.3	15.0	2.5
55	6.7	1.7	6.6	2.2	6.8	1.0	5.4	1.6	5.5	2.1	5.3	.9	11.8	2.7	11.6	3.6	11.9	1.6
65	5.5	1.1	5.7	1.4	5.1	.8	4.6	1.1	4.9	1.4	4.0	.7	9.9	1.9	10.1	2.4	9.7	1.3
75	4.3	.6	4.6	.8	3.8	.5	3.6	.6	4.0	.8	3.0	.5	8.7	1.1	8.9	1.5	8.4	.7
100	3.3	------	3.7	------	2.8	------	2.7	------	3.2	------	2.1	------	7.8	------	8.0	------	7.5	------

Table 1. *Tuberculosis All Forms: Selected death rates and ratios by successive complementary age groups for race and sex, United States, 1947*—Con.

Given age	All races						White						Nonwhite					
	Total		Male		Female		Total		Male		Female		Total		Male		Female	
	Younger than given age	Given age and older	Younger than given age	Given age and older	Younger than given age	Given age and older	Younger than given age	Given age and older	Younger than given age	Given age and older	Younger than given age	Given age and older	Younger than given age	Given age and older	Younger than given age	Given age and older	Younger than given age	Given age and older
	Percent of tuberculosis deaths (each race and sex group=100 percent)																	
0	----	100	----	100	----	100	----	100	----	100	----	100	----	100	----	100	----	100
5	2	98	2	98	3	97	2	98	2	98	3	97	3	97	3	97	3	97
10	3	97	2	98	4	96	2	98	2	98	4	96	4	96	3	97	4	96
15	4	96	3	97	5	95	3	97	2	98	4	96	5	95	5	95	6	94
20	7	93	5	95	11	89	5	95	3	97	8	92	13	87	9	91	17	83
25	15	85	10	90	24	76	10	90	7	93	18	82	26	74	19	81	35	65
30	23	77	15	85	36	64	17	83	11	89	28	72	39	61	28	72	52	48
35	31	69	21	79	47	53	24	76	16	84	39	61	49	51	38	62	64	36
45	48	52	39	61	64	36	40	60	32	68	56	44	69	31	59	41	80	20
55	66	34	61	39	76	24	60	40	55	45	68	32	85	15	80	20	91	9
65	83	17	82	18	85	15	79	21	79	21	80	20	94	6	92	8	96	4
75	95	5	95	5	94	6	93	7	94	6	92	8	98	2	98	2	99	1
100	100	----	100	----	100	----	100	----	100	----	100	----	100	----	100	----	100	----

NOTE.—The maximum age of 100 years assumes that no person attains the age of 100 years.

SOURCE: Tuberculosis deaths—Tuberculosis Mortality in the United States, 1947, Pub. Health Rep. 64: 405 (1949). Deaths from all causes—Deaths by Age: United States, 1947, National Office of Vital Statistics, Release FSA-503, January 30, 1949. Population—Current Population Reports, Series P-25, No. 21, Bureau of the Census, Department of Commerce, May 27, 1949, table 2.

Tuberculosis Deaths, Death Rates and Population

This compilation presents (table 2) the number of deaths from tuberculosis (all forms), the tuberculosis death rates, and the corresponding estimated populations from which these rates have been computed, by age, race, and sex for the United States, for 1947. The number of deaths and the estimated population are additive in any combination. Population estimates are rounded to the nearest thousand without adjustment to group totals, which are independently rounded. The rates are not additive. To derive a rate for a population group not explicitly set forth, the deaths and the population for the new grouping must each be summed; then the specific rate is computed by dividing the number of deaths by the population.

Data for tuberculosis deaths by specified race are presented in table 3. Tuberculosis mortality tabulations for race usually group deaths by the categories white and nonwhite. Here, the nonwhite category is shown by the specific races which comprise it, namely, Negro, Chinese, Japanese, Indian, and other. Population estimates for a 7-year postcensal period are speculative, and the accompanying death rates by race should be regarded as subject to possible revision after the 1950 census.

Table 2. *Tuberculosis (all forms) deaths and rates for various age groups by race and sex, with populations, United States, 1947*

Age in years	All races								
	Both sexes			Male			Female		
	Deaths	Rate	Estimated population	Deaths	Rate	Estimated population	Deaths	Rate	Estimated population
Total	48,064	33.5	143,411,000	30,585	43.0	71,140,000	17,479	24.2	72,274,000
0–4	1,099	7.5	14,604,000	579	7.8	7,453,000	520	7.3	7,151,000
5–9	226	1.9	12,110,000	107	1.7	6,174,000	119	2.0	5,937,000
10–14	373	3.5	10,667,000	148	2.7	5,413,000	225	4.3	5,254,000
15–19	1,720	15.6	11,000,000	637	11.7	5,449,000	1,083	19.5	5,551,000
20–24	3,612	30.3	11,919,000	1,440	24.7	5,840,000	2,172	35.7	6,079,000
25–29	3,896	33.3	11,711,000	1,685	29.7	5,674,000	2,211	36.6	6,037,000
30–34	3,801	34.2	11,117,000	1,919	35.6	5,383,000	1,882	32.8	5,735,000
35–44	8,314	41.4	20,082,000	5,338	54.0	9,883,000	2,976	29.2	10,200,000
45–54	8,865	52.8	16,796,000	6,845	81.8	8,368,000	2,020	24.0	8,429,000
55–64	7,999	62.8	12,747,000	6,377	99.4	6,415,000	1,622	25.6	6,332,000
65–74	5,586	76.2	7,335,000	3,971	111.5	3,563,000	1,615	42.8	3,772,000
75 and over	2,544	76.5	3,325,000	1,522	99.8	1,525,000	1,022	56.8	1,800,000
Not stated	29			17			12		
Under 15	1,698	4.5	37,381,000	834	4.4	19,040,000	864	4.7	18,342,000
15–24	5,332	23.3	22,919,000	2,077	18.4	11,289,000	3,255	28.0	11,630,000
25–44	16,011	37.3	42,910,000	8,942	42.7	20,940,000	7,069	32.2	21,972,000
45–64	16,864	57.1	29,543,000	13,222	89.4	14,783,000	3,642	24.7	14,761,000
65 and over	8,130	76.3	10,660,000	5,493	108.0	5,088,000	2,637	47.3	5,572,000
15–34	13,029	28.5	45,747,000	5,681	25.4	22,346,000	7,348	31.4	23,402,000
15–44	21,343	32.4	65,829,000	11,019	34.2	32,229,000	10,324	30.7	33,602,000
15–54	30,208	36.6	82,625,000	17,864	44.0	40,597,000	12,344	29.4	42,031,000
20–34	11,309	32.5	34,747,000	5,044	29.9	16,897,000	6,265	35.1	17,851,000
20–44	19,623	35.8	54,829,000	10,382	38.8	26,780,000	9,241	32.9	28,051,000
25–34	7,697	33.7	22,828,000	3,604	32.6	11,057,000	4,093	34.8	11,772,000
25–54	24,876	41.7	59,706,000	15,787	53.9	29,308,000	9,089	29.9	30,401,000
15 years and over	46,337	43.7	106,032,000	29,734	57.1	52,100,000	16,603	30.8	53,935,000

Table 2. *Tuberculosis (all forms) deaths and rates for various age groups by race and sex, with populations, United States, 1947*—Continued

Age in years	All races								
	Both sexes			Male			Female		
	Deaths	Rate	Estimated population	Deaths	Rate	Estimated population	Deaths	Rate	Estimated population
	White								
Total	34,783	27.1	128,326,000	23,167	36.3	63,764,000	11,616	18.0	64,562,000
0–4	724	5.6	12,836,000	377	5.7	6,569,000	347	5.5	6,267,000
5–9	122	1.2	10,474,000	57	1.1	5,352,000	65	1.3	5,122,000
10–14	150	1.6	9,269,000	63	1.3	4,715,000	87	1.9	4,554,000
15–19	764	7.9	9,661,000	296	6.2	4,793,000	468	9.6	4,868,000
20–24	1,795	17.0	10,572,000	717	13.8	5,185,000	1,078	20.0	5,387,000
25–29	2,209	21.1	10,456,000	988	19.4	5,085,000	1,221	22.7	5,371,000
30–34	2,406	24.2	9,946,000	1,206	24.9	4,842,000	1,200	23.5	5,104,000
35–44	5,778	32.0	18,080,000	3,752	42.0	8,933,000	2,026	22.1	9,147,000
45–54	6,726	44.0	15,271,000	5,314	69.7	7,621,000	1,412	18.5	7,650,000
55–64	6,823	57.7	11,825,000	5,491	92.4	5,942,000	1,332	22.6	5,883,000
65–74	4,947	72.2	6,856,000	3,531	106.5	3,315,000	1,416	40.0	3,541,000
75 and over	2,321	75.3	3,081,000	1,365	96.7	1,412,000	956	57.3	1,669,000
Not stated	18			10			8		
Under 15	996	3.1	32,579,000	497	3.0	16,636,000	499	3.1	15,943,000
15–24	2,559	12.6	20,233,000	1,013	10.2	9,978,000	1,546	15.1	10,255,000
25–44	10,393	27.0	38,482,000	5,946	31.5	18,860,000	4,447	22.7	19,622,000
45–64	13,549	50.0	27,096,000	10,805	79.7	13,563,000	2,744	20.3	13,533,000
65 and over	7,268	73.1	9,937,000	4,896	103.6	4,727,000	2,372	45.5	5,210,000
15–34	7,174	17.7	40,635,000	3,207	16.1	19,905,000	3,967	19.1	20,730,000
15–44	12,952	22.1	58,715,000	6,959	24.1	28,838,000	5,993	20.1	29,877,000
15–54	19,678	26.6	73,986,000	12,273	33.7	36,459,000	7,405	19.7	37,527,000
20–34	6,410	20.7	30,974,000	2,911	19.3	15,112,000	3,499	22.1	15,862,000
20–44	12,188	24.8	49,054,000	6,663	27.7	24,045,000	5,525	22.1	25,009,000
25–34	4,615	22.6	20,402,000	2,194	22.1	9,927,000	2,421	23.1	10,475,000
25–54	17,119	31.8	53,753,000	11,260	42.5	26,481,000	5,859	21.5	27,272,000
15 years and over	33,769	35.3	95,748,000	22,660	48.1	47,128,000	11,109	22.8	48,620,000
	Nonwhite								
Total	13,281	88.0	15,088,000	7,418	100.6	7,376,000	5,863	76.0	7,712,000
0–4	375	21.2	1,769,000	202	22.9	884,000	173	19.5	885,000
5–9	104	6.4	1,635,000	50	6.1	821,000	54	6.6	814,000
10–14	223	16.0	1,398,000	85	12.2	698,000	138	19.7	700,000
15–19	956	71.4	1,340,000	341	51.9	657,000	615	90.0	683,000
20–24	1,817	135.0	1,346,000	723	110.4	655,000	1,094	158.3	691,000
25–29	1,687	134.4	1,254,000	697	118.3	589,000	990	148.9	665,000
30–34	1,395	119.0	1,172,000	713	131.8	541,000	682	108.1	631,000
35–44	2,536	126.6	2,003,000	1,586	166.9	950,000	950	90.2	1,053,000
45–54	2,139	140.3	1,525,000	1,531	205.2	746,000	608	78.0	779,000
55–64	1,176	127.5	922,000	886	187.3	473,000	290	64.6	449,000
65–74	639	133.4	479,000	440	177.4	248,000	199	86.1	231,000
75 and over	223	91.4	244,000	157	138.9	113,000	66	50.4	131,000
Not stated	11			7			4		
Under 15	702	14.6	4,802,000	337	14.0	2,403,000	365	15.2	2,399,000
15–24	2,773	103.2	2,686,000	1,064	81.1	1,312,000	1,709	124.4	1,374,000
25–44	5,618	126.8	4,429,000	2,996	144.0	2,080,000	2,622	111.6	2,349,000
45–64	3,315	135.5	2,447,000	2,417	198.3	1,219,000	898	73.1	1,228,000
65 and over	862	119.2	723,000	597	165.4	361,000	265	73.2	362,000
15–34	5,855	114.5	5,112,000	2,474	101.3	2,442,000	3,381	126.6	2,670,000
15–44	8,391	117.9	7,115,000	4,060	119.7	3,392,000	4,331	116.3	3,723,000
15–54	10,530	121.9	8,640,000	5,591	135.1	4,138,000	4,939	109.7	4,502,000
20–34	4,899	129.9	3,772,000	2,133	119.5	1,785,000	2,766	139.2	1,987,000
20–44	7,435	128.7	5,775,000	3,719	136.0	2,735,000	3,716	122.2	3,040,000
25–34	3,082	127.0	2,426,000	1,410	124.8	1,130,000	1,672	129.0	1,296,000
25–54	7,757	130.3	5,954,000	4,527	160.2	2,826,000	3,230	103.3	3,128,000
15 years and over	12,568	122.2	10,285,000	7,074	142.3	4,972,000	5,494	103.4	5,313,000

SOURCE: Tuberculosis deaths—Tuberculosis Mortality in the United States, 1947, Pub. Health Rep. 64: 405 (1949). Population—Current Population Reports, Series P-25, No. 21, Bureau of the Census, Department of Commerce, May 27, 1949, table 2.

Table 3. *Tuberculosis deaths and death rates by specified race, United States, 1947*

	Total	White	Non-white	Negro	Indian	Chinese	Japanese	All others
Number of tuberculosis deaths:								
All forms	48,064	34,783	13,281	12,271	695	165	92	58
Respiratory system	44,462	32,504	11,958	11,097	574	151	84	52
Other forms	3,602	2,279	1,323	1,174	121	14	8	6
Tuberculosis death rate per 100,000 population:								
All forms	33.5	27.1	88.0	85.1	173.3	191.9	71.9	96.7

SOURCE: Memorandum, National Office of Vital Statistics, Federal Security Agency, May 24, 1949.

Tuberculosis and its Control in Rural Areas

By MILTON I. ROEMER, M.D., M. P. H.*

Historically, tuberculosis has been a predominantly urban disease in the United States. Associated with poverty, congested housing, poor nutrition, and over-exertion, tuberculosis has taken its greatest tolls in the slums of the big city. By the same token, the remarkable decline in the tuberculosis death rate since about 1900 has been due in the main to urban developments. Improvements in housing and nutrition, rises in real wages, isolation and treatment of cases in sanatoria have doubtless all played their part. In the meantime, what has been happening to tuberculosis in rural areas?

It is difficult to give an exact answer. The recording of deaths in the United States before 1937 was solely by place of occurrence. rather than by place of residence. As hospitalization of the tuberculous in sanatoria, usually located in country districts, became more widespread, an increasing proportion of deaths were artifically credited to rural places. Census Bureau definitions of "rural," moreover, have changed over the years, as has the accuracy of death reporting in country districts. Despite these serious limitations of available data, certain general trends in the tuberculosis death rate, as between cities and rural districts, are evident.

Rural and Urban Tuberculosis Death Rates

While tuberculosis mortality has been declining in urban and rural sections alike, it is probable that the decline in the cities has been at a greater rate than in the country. In 1890, when sanatorium deaths were too few to influence the rural-urban comparisons substantially (even though deaths were recorded by place of occurrence), the death

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rate for pulmonary tuberculosis in the cities of registration States was 293 per 100,000, while in the rural parts of these States (defined then as places of under 8,000 inhabitants) it was 181 per 100,000 (*1*). Skipping over the years in which statistical comparisons of data recorded by place of occurrence become more difficult to interpret because of increased recording of deaths in rural sanatoria, and coming to 1940 when deaths were recorded by place of residence,[1] the death rates were as follows: 54.6 per 100,000 in cities of 100,000 population and over; 42.4 in cities of 10,000 to 100,000; 47.7 in towns of 2,500 to 10,000; and 41.3 in rural areas (defined as places of less than 2,500 and open country) (*2*). Thus, from an urban death rate 62 percent higher than the rural rate in 1890, the differential fell to a total urban rate (49.4 per 100,000) only about 20 percent higher than the rural rate in 1940.

Accurate urban and rural tuberculosis death rates cannot be determined for any year since 1940, because accurate rural-urban population data are not available. On the basis of intercensal estimates of population, however, rough rates can be computed. Thus, in 1946, there were 31,804 tuberculosis deaths reported for urban places, and 19,107 for rural areas (*3*). In that year, the Census Bureau estimated the urban civilian population at about 82,149,000 and the rural, about 54,818,000 (*4*). Accordingly, the approximate urban tuberculosis death rate in 1946 was 38.7 per 100,000 and the rural rate 34.9. It may be noted that this represents a continued decline of the urban rate at a more rapid pace than the rural rate, with the urban rate only 9.8 percent higher than the rural in 1946.

Even in 1940, the rural tuberculosis death rate was higher than the urban in certain demographic groups. The most striking relationship was evident in death rates for white females, with the rural death rate actually higher than the urban at all ages from 15 years up. The total age-standardized death rate for tuberculosis among rural white females in 1940 was 30.9 per 100,000 compared with 26.1 for urban white females. Among nonwhite females, the rural death rate exceeded the urban at ages above 54 years. Among white males the rural death rate exceeded the urban at ages above 74 years; and among nonwhite males, at ages above 84 years (*5*).

These demographic findings may, in a sense, foreshadow over-all future trends, for they illustrate what happens to the tuberculosis death rate in sex and age groups least subject to frequent epidemiologic contacts. Of the various demographic groups, surely white women

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[1] Even the current practice entails some error since residence is defined as the usual place of residence unless the decedent has resided elsewhere for 1 year or longer prior to death; thus, if an urban patient with tuberculosis is hospitalized in a rural sanatorium for more than a year before death, the death is recorded for the rural location. In recent years, however, there has been increasing emphasis upon the construction of sanatoria in urban centers and surgical developments have shortened the average duration of hospitalization, so that the over-all effect of this recording practice is now probably not great.

are the most favored with respect to contact with the general population. Aged persons of the other sex-race groups are likewise of relatively low mobility among the general population, so that contact is also most likely to be minimal. In the demographic groups with fewest epidemiologic contacts, in other words, the rural death rate from tuberculosis is already higher than the urban. Case finding and isolation of active cases from a community achieve the same effect as reduction of epidemiologic contacts. As these steps are increasingly taken in the cities, therefore, we may expect the curves for urban and rural tuberculosis death rates ultimately to cross, with urban rates becoming lower than rural for all age-sex-racial groups.

Rural Life and Tuberculosis

The task of controlling tuberculosis in rural America is made difficult by all the factors that impede the provision of general public health and medical services. Low per-capita income and low population density, with concomitant deficiencies of medical personnel, facilities, and health agencies, create handicaps in the battle against tuberculosis and, for that matter, most other diseases.

Rural poverty has its effects on the problem of tuberculosis, as does the squalor of city slums. The central fact that characterizes the approximately 55,000,000 Americans living in rural areas, as compared with city-dwellers, is their lower average family incomes, even taking full account of the value of home produced and consumed food and fuel. Despite unprecedented farm prosperity, the net per-capita income of persons living on farms (including income from nonfarm employment and the value of home produced and consumed goods) in 1945 was $743, compared with $1,259 for the nonfarm population (*6*). While about 40 percent of the rural population is not engaged in agriculture, rural nonfarm income levels are closer to those of the farm population than to those of the urban population. There are, of course, vast differences among the rural regions of the Nation—especially between the heavily populated rural South and the sparsely settled Great Plains—but the general standard of living, with all its relationships to the basic etiology of tuberculosis, is substantially lower in rural areas of the Nation as a whole than in the cities.

All the elements entering into a standard of living, with their rural and urban levels, cannot be analyzed here. To cite only the most obvious—education, housing, nutrition and the use of labor-saving devices—is to reveal the basic distinction. It is generally recognized that rural educational levels (and this includes education on personal hygiene and living habits) are woefully below the urban. Furthermore, it may not be so widely recognized that average rural housing is actually more congested than urban, with 6 percent of urban dwell-

ings classified by the Census Bureau as seriously overcrowded in 1940, compared with 11 percent of rural nonfarm homes and 16 percent of farmhouses (*7*). It must be recalled that rural families are larger than urban and that acres of land around a home do not add an inch of space to the rooms in which the family eats, sleeps, and lives.

The comparative level of urban and rural nutrition is difficult to evaluate. There is some evidence that in generally poor economic periods, like the depression of the 1930's, the level of rural nutrition is slightly better than urban, though much less so than one might expect among families of the soil (*8*). In more prosperous periods, urban eating habits improve enormously and it is quite likely that they exceed rural levels of achievement of the ideally balanced diet. As for the use of labor-saving machinery, any marketer of washing machines, vacuum cleaners, or automobiles will testify to the higher utilization of consumer-durable goods among city families.

The relevance of all this to the problem of tuberculosis would seem to be simply this: if tuberculosis is the classical "social disease" (*9*), the socio-environmental factors contributing to its occurrence are today found most strikingly in rural parts of the United States, with one important exception, epidemiologic contacts. Those are obviously much more frequent in industrialized urban centers. It is probably safe to say that, except for the increased opportunity for the person-to-person spread of tubercle bacilli in the cities, the conditions of rural life in America today provide the basis for a higher tuberculosis mortality than do those of urban life. When we select demographic groups in which social contacts are relatively fewer, as we have done above, this fact emerges sharply.

There is little evidence for the assumption of some that urban men experience higher tuberculosis death rates than rural men because industrial labor involves greater physical exertion than other forms of labor (*5*). Few farmers or farm laborers who work from dawn to dusk would agree with this, as would few miners, fishermen, or lumbermen, the vast majority of whom are country dwellers. Likewise, little agreement would be found among the growing ranks of employees of small-town and village industries which, being less fully unionized and less competitive for a supply of labor, offer generally inferior working conditions than urban factories. There is one predominantly rural occupation in which tuberculosis is a special hazard. About 73 percent of the Nation's miners are country dwellers, and the hazard of silicosis with associated tuberculosis is well recognized among them. Coal miners with silicosis constitute a major problem in the tuberculosis control program of the rural counties in West Virginia.

Measures for Urban and Rural Tuberculosis Control

As efforts are increased in the cities to reduce the chances of epidemiologic contact with unrecognized cases of tuberculosis, we may expect, as suggested above, that in time the urban prevalence of the disease in both sexes and all races will decline below that for rural areas. The prinicpal measures which are being employed are case finding and isolation—the former through the general services of private physicians, public health tuberculosis clinics, mass X-ray surveys, and related practices; the latter through hospitalization in sanatoria. If the rural burden of tuberculosis is to be reduced at a rate commensurate with urban improvement, comparable measures of medical and public health control will be necessary.

To face this challenge calls for action in every aspect of national health planning. The services of physicians must be made available to rural people through a comprehensive national approach. An increase in total output of medical personnel is needed, combined with measures to attract them to rural practice. It is widely recognized that this requires assurance of adequate purchasing power foı physicians' services and provision of regionalized plans of modern hospital and laboratory facilities. The National Hospital Survey and Construction Act, as passed by Congress in August 1946, falls far short of achieving the latter end, exactly as champions of rural health service had predicted. Little inducement for undertaking needed construction is offered to low-income rural communities when the Federal Government provides funds for only one-third of the cost. In West Virginia, for example, two and a half years after passage of the law, not a single new rural hospital or health center has yet been constructed under this program. All this has its ultimate effects in handicapping the rural attack on tuberculosis.

Aside from the diagnosis of tuberculosis through the acumen of private physicians (made more difficult by the lack of X-ray and laboratory equipment in rural practice), the major methods of case finding are, of course, through the efforts of public health agencies. The over-all deficiencies of public health coverage in rural areas are too well recognized to require recitation here (*10*). In terms of tuberculosis control, they mean fewer public health nurses for epidemiologic work-up of cases and contacts in the home, fewer tuberculosis clinics for examination of suspects, contacts, or the general population, and far fewer facilities and equipment for mass chest X-ray surveys (*11*). It is rare that an urban health department lacks a chest clinic, but commonplace for a rural public health agency to have no significant provision for tuberculosis control in its total program. Deficiencies

NOTE. For a fuller discussion of rural health service facilities, see Rural Health and Medical Care, by Mott and Roemer (*8*).

in rural environmental sanitation have their special effects on tuberculosis by allowing the continued, albeit slight, occurrence of bovine-type tuberculosis in rural districts through the consumption of unpasteurized milk.

The sweeping case-finding accomplishments of community-wide mass chest X-ray surveys are being enjoyed mainly by the residents of large and medium-sized cities. Naturally, measures of this type will be employed where the yield of detected cases per dollar spent will be greatest and, at present, this will nearly always be higher in the larger cities. Even in relatively rural counties, when mobile chest X-ray units from a State health department arrive, the population surveyed will be mainly the residents of the county seat or other urban center in the county. In Monongalia County, West Virginia, for example, a recent chest X-ray survey by a mobile unit screened 1,100 persons per day in a 4-day stand at the county seat (Morgantown), but only 300 per day when the unit stopped at a rural village (Blacksville) in the center of the county's principal farming section; yet, equal efforts were put forth to bring in people at both places. It is simply harder to reach scattered rural people with any social or technical service. They can only be reached if public agencies are willing to spend more money per person served.

Where public health agencies are weak, there are often voluntary health agencies to fill the gap. But even this is most generally true in urban centers. Tuberculosis and health associations—probably the Nation's most well-established voluntary health agencies—are strongest in the larger cities. It is true that in many rural counties virtually the only tuberculosis control program in operation is that promoted from the proceeds of local Christmas seal sales. But in hundreds of rural counties, both with and without official health agencies, there is no active tuberculosis association at all.

There are further ways in which tuberculosis case-finding efforts in rural sections fall short of urban practice. A chest X-ray, as a pre-employment routine, is becoming increasingly common in the large plants of the Nation's industrial centers, but is rare in small-town industry. School teachers are often systematically checked for tuberculosis in the larger cities but rarely in rural counties. The school board in Monongalia County declined to make an annual chest X-ray mandatory for the 450 school teachers in the county, although the year before a teacher of a one-room school was found to have a case of moderately advanced pulmonary tuberculosis. In large-city hospitals, a routine chest X-ray of all patients on admission is coming to be an accepted procedure, but only a handful of rural hospitals are doing this. The cost-per-patient tends to be too high to justify the installation of photofluorographic equipment in hospitals of under

100 beds, and most rural institutions are below this capacity. A hospital of 125 beds in Monongalia County installed such equipment only because it was purchased by the West Virginia State Department of Health. Not one of the other 54 counties of this predominantly rural State has such facilities, however.

Once cases of tuberculosis are found, facilities for their care are far less adequate in rural sections than in urban areas. The conventional method of evaluating the adequacy of tuberculosis sanatorium facilities—in terms of beds per annual death—takes account of the lesser need in those rural States which today may have a relatively lower prevalence of the disease. Yet, even by this measure, the States with 50 percent or more urban population have about twice the supply of tuberculosis beds, relative to the extent of their problem, as the predominantly rural States. In States with less than 30 percent rural population there were, in 1942, 2.0 beds per annual tuberculosis death; States with 30–39 percent rural population had 1.7 beds per death; States 40–49 percent rural had 1.6 beds per death; States 50–59 percent rural had 1.1 beds; States 60–69 percent rural had 0.7 beds; and States 70 percent or more rural had 0.9 beds per annual death (*12*). There is nothing to indicate any appreciable change in this relative picture since 1942. These figures actually understate the true rural-urban differential in facilities, since many of the beds in both the urban and rural States are in city- or county-owned (rather than State) institutions which admit only residents of the local political unit, and it is seldom indeed that a rural county can afford a sanatorium of its own. The Negro population, which is predominantly rural, is especially undersupplied as far as sanatorium facilities are concerned.

The shortage of sanatorium beds in rural States has obvious implications for the control of tuberculosis in rural areas. Typically, there is a waiting list of patients seeking admission. This means that active cases of tuberculosis remain in the community for months, or permanently, rather than in isolation. If they are kept in bed at home, it is the rare rural home that can provide proper protection for the rest of the family—a family usually larger than its urban counterpart.

The spread of the disease is further aggravated by the policy of sanatoria in many rural States to give admission preference to early cases—cases with a good prospect for recovery. In West Virginia, for example, a patient must be able to "walk in" to be admitted to one of the three State institutions. Other rural States specifically bar far-advanced cases. Such policies, growing from a desperate effort to accommodate to a shortage of beds, leave the most highly infectious cases in the farmhouse or village.

With insufficient funds appropriated to operate the sanatoria in most rural States, they are often unpleasant places in which to spend months of time, and many patients offered a bed refuse to go. Compulsory hospitalization of infectious tuberculosis may be possible under law; but the average health officer hesitates to invoke such authority, and the bed will be taken by a perhaps less needy case. Poor sanatorium conditions, moreover, yield a high rate of departures against medical advice so that infectious cases often return to their rural homes free to spread the disease again.

A means test for free hospitalization, finally, is still retained in most rural States, impeding the admission of patients not willing to pay a part of their maintenance. In West Virginia, persons not certified as medically indigent long had to pay $1 per day for their care. The concerted action of citizens' groups and public health workers recently succeeded in eliminating this requirement, and in making sanatorium care completely tax-supported as of July 1949.

Other aspects of rural community organization have a bearing on the total problem of tuberculosis control. Rural welfare programs are notably weaker than urban, so that public assistance to the family, whose breadwinner or homemaker has been disabled by tuberculosis (either in a sanatorium or bedridden at home), is less adequate. This is true of the Federal-State aid to dependent children program, as well as the State-local programs of general relief. Voluntary relief agencies often supplement public assistance substantially in the larger cities, but the aid they can offer in rural communities is usually meager. This huge problem of family dependency often leads the husband or wife to resist hospitalization until the disease makes them collapse.

In a few States—Rhode Island, California, New York, New Jersey, and Washington—compulsory disability insurance laws have been passed which provide some financial assistance to workers disabled with tuberculosis (or other diseases) up to 26 weeks a year, and there is a likelihood that such legislation will be enacted in other States (*13*). Since these social insurance programs are tied to the unemployment compensation systems, however, they do not cover agricultural employment and so offer few benefits in rural areas.

The pattern of American agriculture, involving large seasonal migrations at harvest time, creates a special tuberculosis problem among migratory farm workers. At the very bottom of the rural economic ladder, migrants have an especially high rate of tuberculosis. Yet, lacking residence in the places where they work many months of the year, hospitalization is often not available to them, and the infection may be carried from State to State even after a diagnosis has been made (*14*).

The Rural Challenge

As living conditions improve, and effective case finding, treatment, and isolation of cases continue to reduce the prevalence of tuberculosis in the cities of the Nation, we will ultimately be faced with the task of final eradication of the disease in the rural areas. The very reduction of the urban prevalence, it is true, will have its indirect effects in reducing the rural prevalence simply because much of the disease in country-dwellers is contracted during visits to the cities. But present trends point to the time when tuberculosis may become the predominantly rural problem that typhoid fever, once an urban scourge, has become in the last 30 or 40 years.

Despite the difficulties of applying medical and public health measures in rural areas, the lesser epidemiologic contacts of country-dwellers remain a distinct advantage in the fight on the disease in rural areas. While it may be harder to find cases among rural people and, once found, harder to get them isolated and treated, the channels of person-to-person spread are, on the whole, fewer. In this sense, an active attack on the disease in rural sections can be highly rewarding and, coupled with vigorous efforts in the cities, can actually bring us to the goal of complete eradication.

Despite the trend of urban and rural death-rate curves, the lowest State-wide tuberculosis death rates are in predominantly rural areas. In 1947, death rates of 20 per 100,000 or lower were achieved in Idaho, Iowa, Kansas, Minnesota, Nebraska, New Hampshire, North Dakota, Utah, Wisconsin, and Wyoming (*15*).

The attack on rural tuberculosis can hardly be effective except as it is launched on all the fronts of rural health service. Rural housing, education, nutrition, and general living standards must be elevated. The services of competent physicians—specialists as well as general practitioners—must be made available for the everyday care and prevention of illness. General hospitals and tuberculosis sanatoria must be expanded commensurate with need. Public health agencies must be extended to cover every country-dweller, and X-ray services for periodic chest check-ups must be made generally accessible. Social measures to provide for the families of persons disabled with tuberculosis must be provided.

Unless these steps are taken, we may expect a permanent reservoir of tuberculosis to smolder indefinitely in rural districts. With these steps taken in city and country alike, tuberculosis can be eradicated from America.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 17, 1949

A decline less sharp than during the preceding week was recorded in the reported incidence of poliomyelitis—from a total of 2,701 cases last week to 2,624 currently. The 5-year (1944–48) median is 1,440. For the corresponding week last year the total was 1,839, representing an increase of 313 cases. Currently, decreases were recorded in the 6 Central, South Atlantic, and Mountain divisions, but in the New England, Middle Atlantic, and Pacific areas, increases of 32, 27, and 21 cases, respectively, were reported. An aggregate increase of 216 cases was recorded in 23 States, none showing an increase of more than 22 cases.

The 30 States reporting currently more than 18 cases each are as follows (last week's figures in parentheses): *Increases*—Maine 50 (47), Massachusetts 165 (145), Connecticut 56 (43), New York 354 (336), New Jersey 127 (105), Illinois 196 (191), Michigan 208 (195), Minnesota 150 (128), North Dakota 35 (23), Kansas 51 (47), Virginia 26 (21), Louisiana 22 (6), Washington 39 (34), Oregon 27 (17), California 127 (121); *decreases*—Pennsylvania 64 (77), Ohio 146 (178), Wisconsin 64 (82), Iowa 64 (75), Missouri 60 (75), South Dakota 23 (44), Nebraska 46 (60), Kentucky 32 (41), Tennessee 27 (32), Arkansas 25 (34), Oklahoma 50 (86), Texas 52 (65), Idaho 21 (28), Colorado 54 (77); *no change*—Indiana 68. The total for the year to date is 29,091, as compared with 16,022 for the corresponding period last year and a 5-year median of 12,412.

Of the total of 31 cases of infectious encephalitis reported, in 12 States, only 2 States reported more than 2 cases each—North Dakota 10 (last week 6), and Colorado 9 (last week 10). Two cases of anthrax were reported during the week, 1 each in New York and Ohio, and 2 cases of leprosy, 1 each in California and Minnesota.

A total of 8,508 deaths was recorded during the week in 94 large cities in the United States, as compared with 7,831 last week, 8,208 and 8,312, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,267. For the year to date the total is 340,683, as compared with 343,384 for the same period last year. Infant deaths for the week totaled 640, last week 552, same week last year 609, 3-year median 701. The cumulative figure is 24,148, same period last year, 24,797.

Telegraphic case reports from State health officers for week ended September 17, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	-	-	-	1	-	-	50	-	1	-	-	-	3	-
New Hampshire	-	-	-	-	-	-	16	-	-	-	-	-	-	-
Vermont	-	-	-	2	-	-	12	-	3	-	-	-	7	-
Massachusetts	3	1	-	12	-	-	165	-	11	-	-	-	112	-
Rhode Island	-	-	-	3	-	2	17	-	-	-	-	-	5	-
Connecticut	-	-	-	2	-	27	56	-	-	-	-	-	38	-
MIDDLE ATLANTIC														
New York	3	1	(c)	43	2	156	354	-	[d] 22	-	-	3	199	15
New Jersey	-	1	2	35	3	35	127	-	5	-	-	2	131	-
Pennsylvania	3	-	(c)	15	5	52	64	1	14	-	-	8	131	1
EAST NORTH CENTRAL														
Ohio	2	-	-	10	1	26	140	-	33	-	2	1	67	8
Indiana	10	2	-	7	-	3	68	1	11	-	-	-	13	9
Illinois	2	2	-	21	3	57	196	-	19	-	1	3	88	-
Michigan [a]	2	-	3	26	2	30	208	-	34	-	-	-	95	6
Wisconsin	-	-	-	35	2	6	64	-	8	-	-	2	75	-
WEST NORTH CENTRAL														
Minnesota	-	-	-	1	2	4	150	-	12	-	-	1	3	1
Iowa	-	-	-	2	-	-	64	-	5	-	-	1	6	4
Missouri	2	1	2	-	-	1	60	-	1	-	1	1	11	-
North Dakota	-	10	-	1	1	-	35	-	3	-	-	-	1	-
South Dakota	-	1	-	-	1	-	23	-	1	-	-	-	-	-
Nebraska	2	-	5	1	-	-	46	-	11	-	-	1	-	-
Kansas	-	-	3	-	-	2	51	-	2	-	-	1	4	-
SOUTH ATLANTIC														
Delaware	-	-	-	1	-	-	3	-	-	-	-	1	1	-
Maryland [a]	1	-	2	4	-	18	3	-	4	-	-	3	34	-
District of Columbia	2	-	-	2	-	16	8	-	-	-	-	-	-	-
Virginia	3	-	121	5	4	16	26	4	11	-	-	5	14	1
West Virginia	5	-	2	3	1	1	18	-	10	-	-	5	20	-
North Carolina	18	-	-	3	4	-	10	1	34	-	4	1	23	-
South Carolina	10	-	7	4	1	15	9	1	6	-	-	5	2	2
Georgia	20	-	3	1	2	9	8	1	9	-	-	4	2	9
Florida	3	1	6	6	-	9	14	-	3	-	1	1	5	2

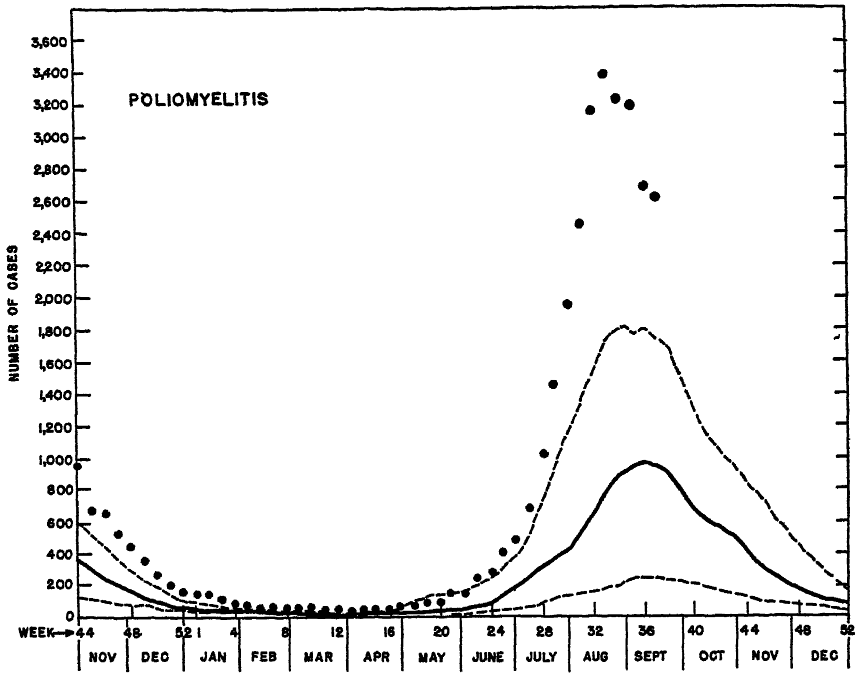
EAST SOUTH CENTRAL														
Kentucky	9			6		15	32		17			8	12	7
Tennessee			3	2	5	19	27		31			13	12	
Alabama	14		7	1	1	22	17		8			2	2	7
Mississippi [a]	9			3		11	11		7			1	3	
WEST SOUTH CENTRAL														
Arkansas	6		9	4		5	25		3		3	2	3	
Louisiana	2				1	19	22		5			6		
Oklahoma	5	1	10	1		15	50	1	2				3	2
Texas	22		422	31	3	149	52		7		1	9	73	11
MOUNTAIN														
Montana	3		2	4		5	7					1	3	
Idaho			6	5		1	21		[d] 20				1	
Wyoming				3		4	7							
Colorado		9	15	2		14	54		5			1	7	
New Mexico				2		8	16		4			3		
Arizona			17	9		6	1		1			1	12	
Utah [a]	1			11		1	18		3		3		8	
Nevada														
PACIFIC														
Washington				10			39		11		2		6	
Oregon			3	19		10	27		3				8	
California	3	1	8	55	2	33	127		[d] 17			9	121	5
Total	165	31	658	414	46	822	2,624	10	417		18	105	1,364	
Median, 1944-48	273	17	623	535	50		1,440	11	751	2	14	146	2,185	
Year to date, 37 weeks	4,897	510	79,863	589,431	2,516	58,861	[1] 29,091	510	59,627	42	887	2,707	43,704	
Median, 1944-48	7,752	423	194,096	552,938	4,666		12,412	473	89,227	277	684	3,000	72,285	
	(27th)		(30th)	(35th)	(37th)		(11th)		(32nd)	(35th)		(11th)	(39th)	
Seasonal low week ends	July 9		July 30	Sept. 3	Sept. 18		Mar. 19		Aug. 13	Sept. 3		Mar. 19	Oct. 2	
Since seasonal low week	1,129		3,996	913	3,360		[1] 28,175		1,367	1		2,247	53,737	
Median, 1944-45 to 1948-49 [b]	2,036		3,899	1,030	6,170		12,149		2,932	4		2,525	98,906	

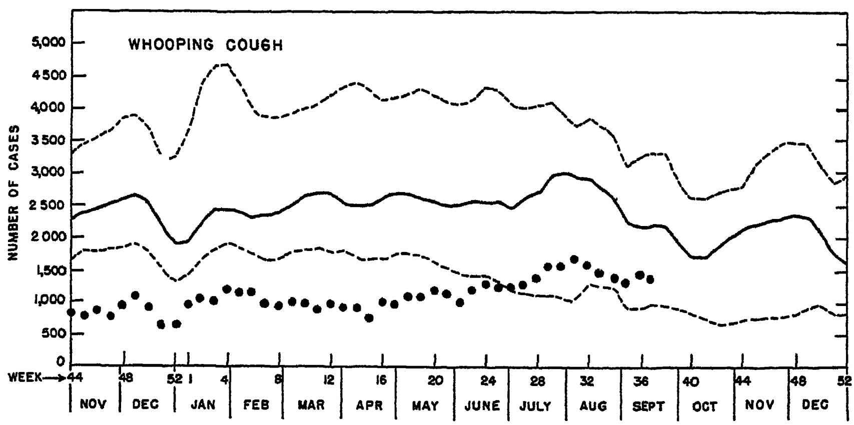
[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for meningitis and whooping cough, the corresponding periods are 1943-44 to 1947-48.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately as follows: Wisconsin 2, Iowa 1, Virginia 2, South Carolina 1, Georgia 3, Kentucky 1, Louisiana 2, Texas 3, California 2.
Cases reported as Salmonella infection not included in the table, were as follows: Massachusetts 2, New York 1.
[1] Poliomyelitis: Delayed reports, Maryland, July onset 4 cases, August onset 6 cases.

Anthrax: New York 1 case, Ohio 1 case.
Leprosy: California, 1 case; Minnesota 1 case (out of state).
Alaska: No cases reported of the diseases included in the table
Hawaii Territory: Measles 24, lobar pneumonia 2.

Communicable Disease Charts

All reporting States, November 1948 through September 17, 1949





The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is a median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1949.

PLAGUE INFECTION IN PARK COUNTY, COLO.

Under date of Sept. 19, plague infection was reported proved in a pool of 22 fleas obtained on Sept. 1 by flagging burrows of prairie dogs, *Cynomys gunnisoni*, at a location 1½ miles south, thence 2½ miles southwest of Fairplay, Park County, Colo.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague in fleas.—On September 8, 1949, plague infection was reported proved in a mass inoculation of 49 fleas taken from 82 rats trapped August 24, 1949, in District 2A, Kukuihaele, Hamakua District, Island of Hawaii, T. H.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended August 27, 1949.—During the week ended August 27, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			1	2	19	25	5	17	25	26	120
Diphtheria	2		1		8						11
Dysentery, bacillary					1			1			2
Encephalitis, infectious							1	2			3
Influenza							11	1			12
German measles			2		1	7	2	2	6	2	22
Measles			3	1	47	21	8	68	19	101	271
Meningitis, meningococcal			1				1				2
Mumps			15		9	42	6	6	9	23	110
Poliomyelitis	5		1	3	72	110	9	10	11	23	244
Scarlet fever			2		6	13	3		6	2	32
Tuberculosis (all forms)	34		8	9	139	16	58	17	59	40	380
Typhoid and paratyphoid fever				1	6	2		1	2		12
Undulant fever					3	2			2		7
Venereal diseases:											
Gonorrhea	14		21	7	98	86	39	17	42	63	387
Syphilis	3		9	5	43	25	4	3	5	13	110
Whooping cough					110	32	1	4	1	4	152

FINLAND

Notifiable diseases—July 1949.—During the month of July 1949, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	10	Paratyphoid fever	140
Diphtheria	76	Poliomyelitis	10
Dysentery	6	Scarlet fever	148
Gonorrhea	686	Syphilis	60
Lymphogranuloma inquinale	1	Typhoid fever	14
Malaria	4		

NEW ZEALAND

Notifiable diseases—5 weeks ended July 30, 1949.—During the 5 weeks ended July 30, 1949, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	10	1	Ophthalmia neonatorum	2	
Diphtheria	24		Poliomyelitis	13	1
Dysentery:			Puerperal fever	2	
Amebic	5		Scarlet fever	95	
Bacillary	62		Tetanus	2	
Encephalitis, lethargic	1		Trachoma	3	
Erysipelas	19		Tuberculosis (all forms)	202	59
Food poisoning	1		Typhoid fever	5	
Lead poisoning	1		Undulant fever	1	
Malaria	2				

POLIOMYELITIS IN FOREIGN COUNTRIES

The following information is taken from copies of the Weekly Epidemiological Record dated September 7 and 14, issued by the World Health Organization:

Australia.—Second quarter of 1949, 200 cases (of which 142 in Melbourne).[1]

Canada.—July 31–August 13, 380 cases (of which 125 in Ontario Province and 61 in Quebec Province).[2]

Denmark.—No epidemic incidence reported.

England and Wales.—First 34 weeks of 1949, 2,741 cases; week ended August 20, 295 cases; week ended August 26, 280 cases; week ended September 3, 308 cases (of which 43 in London).

France.—January–June, 1949, 151 cases; July, 153 cases; August, 304 cases. Widespread geographical distribution reported; small foci in the following Departments: Bouches-du-Rhône, Saône-et-Loire, Seine-et-Oise, and recently Creuse, Rhone, and Seine.

[1] Later report shows 418 cases with 27 deaths in the State of Victoria from January 1 to August 31 (32 cases same period last year). A large number of current cases stated to be in adults. (See Pub. Health Rep. Sept. 30, 1949, p. 1240).

[2] Later information reports 277 cases in Ontario Province from January 1 to August 8 (97 same period last year), of which 172 cases were in Toronto (69 residents, 103 nonresidents; 12 deaths in nonresidents. See Pub. Health Rep. Sept. 9, 1949, p. 1166). Mortality stated to be about 6 percent.

Germany.—British Zone: Week ended September 10, 38 cases, with 1 death. *French Zone:* From the first of the year to August 20, 46 cases with 4 deaths, distributed as follows: Baden, 14 cases; Wurttemburg, 25 cases, 3 deaths; Land Rheno-Palatin, 7 cases, 1 death. *U. S. Zone:* Incidence not above seasonal limits; 45 cases, 6 deaths, in August, of which 35 cases and 5 deaths were in one district. *Berlin:* Week ended September 3, 1 case in the British Sector, 3 cases in the French Sector, and 34 cases, 2 deaths, in the U. S. Sector.

Greece.—Only 11 sporadic cases during the first 7 months of 1949.

India.—During first 8 months of 1949: *Bombay*—289 cases, with 49 deaths; *Calcutta*—Average of 1 case per day; *Delhi*—6 cases in August.

Italy.—January 1–August 31, 1949, 1,590 cases, as compared with 1,606 cases for the corresponding period last year.

Luxemburg.—One isolated case.

Mexico.—August 16–20, 16 cases in Mexico City.

New Zealand.—304 cases during the first quarter of 1949 and 77 cases during the second quarter, but few cases during July and August.

Poland.—47 cases during first 6 months of 1949, as compared with 80 cases for the same period last year.

Scotland.—First 34 weeks of 1949, 173 cases.

Sweden.—January–July and second half of August, 1949, 250 cases.

Yugoslavia.—Situation about the same as in previous years. From January to August 14, 1949, 84 cases, with 14 deaths.

Other Countries.—Indo-china, Kenya, Mauritius, Mozambique, Nyasaland, Tanganyika, and Union of South Africa only a few sporadic cases reported in June. Ceylon, Federated Malay States, Manila, Sarawak, and Singapore only a few sporadic cases reported during July and August, 1949.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Belgian Congo—Stanleyville Province.—On September 3, 1949, 1 fatal case of plague was reported in the village of Bi, southwest of Blukwa, Stanleyville Province, Belgian Congo.

Ecuador—Loja Province.—During the period August 1–15, 1949, 1 case of plague was reported in Balsas, Paltas County, Chaguarpamba District, Loja Province, Ecuador.

Netherlands Indies—Java—Jogjakarta.—During the week ended September 10, 1949, 2 cases of plague were reported in Jogjakarta, Java.

Peru—Lambayeque, Lima, and Piura Departments.—Plague has been reported in Peru as follows: In Lambayeque Department, Chiclayo Province, June 1–30, 1949, 1 case in Chiclayo, June 1–July 31, 2 cases, 2 deaths in Monsefu; in Lima Department, Chancay Province, June 1–30, 1 case in Huacho; in Piura Department, Huancabamba Province, June 1–30, 1 case in Cabezas.

Smallpox

Netherlands Indies—Java—Bandoeng, Batavia, and Semarang.—Smallpox has been reported in cities in Java as follows: In Bandoeng, week ended August 13, 1949, 70 cases; in Batavia, week ended September 3, 312 cases, 36 deaths; in Semarang, week ended August 6, 280 cases, 14 deaths, week ended August 13, 142 cases, 37 deaths, week ended August 20, 94 cases, 17 deaths.

Peru.—During the period June 1–30, 1949, 495 cases of smallpox were reported in Peru.

Typhus Fever

France—Herault Department—Montpellier.—During the period August 21–31, 1949, 1 case of typhus fever was reported in Montpellier, Herault Department, France.

Peru.—During the period June 1–30, 1949, 157 cases of typhus fever were reported in Peru.

Yellow Fever

Sudan (French).—On September 15, 1949, 1 fatal suspected case of yellow fever was reported in Bamako, French Sudan.

DEATHS DURING WEEK ENDED SEPT. 10, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Sept. 10, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	7,831	7,871
Median for 3 prior years	8,306	
Total deaths, first 36 weeks of year	332,175	335,176
Deaths under 1 year of age	560	614
Median for 3 prior years	694	
Deaths under 1 year of age, first 36 weeks of year	23,516	24,188
Data from industrial insurance companies:		
Policies in force	70,176,809	70,907,144
Number of death claims	8,887	9,687
Death claims per 1,000 policies in force, annual rate	6.6	7.1
Death claims per 1,000 policies, first 36 weeks of year, annual rate	9.3	9.5

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 OCTOBER 14, 1949 NUMBER 41

IN THIS ISSUE

Human Body Lice: Artificial Feeding and Infection

Health Is Everybody's Business

Notifiable Diseases, Second Quarter, 1949

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

CONTENTS

	Page
Studies of human body lice, *Pediculus humanus corporis.* H. S. Fuller, E. S. Murray, and J. C. Snyder	1287
Health is everybody's business. Mayhew Derryberry	1293
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended September 24, 1949	1299
Territories and possessions:	
Panama Canal Zone—Notifiable diseases—July 1949	1302
Puerto Rico—Notifiable diseases—4 weeks ended August 27, 1949	1302
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended September 3, 1949	1303
Jamaica—Notifiable diseases—4 weeks ended August 27, 1949	1303
Korea—Encephalitis	1303
New Zealand—Notifiable diseases—4 weeks ended August 27, 1949	1304
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Cholera	1304
Plague	1304
Smallpox	1305
Typhus fever	1305
Yellow fever	1305
Deaths during week ended September 17, 1949	1305
Notifiable diseases, second quarter, 1949	1306

Public Health Reports

Vol. 64 • OCTOBER 14, 1949 • *No. 41*

Studies of Human Body Lice, *Pediculus humanus corporis*

I. A Method for Feeding Lice Through a Membrane and Experimental Infection with *Rickettsia prowazeki, R. mooseri*, and *Borrelia novyi*

By H. S. Fuller, M. D., E. S. Murray, M. D., and J. C. Snyder, M. D.*

In critical laboratory studies of pathogenic organisms which are transmitted by various arthropods, it is frequently desirable to provide the vector with a meal of known composition. Methods have been devised for the artificial feeding of several groups of insects, but they have not been applied with uniform success to the body louse. A few of the many attempts which have been made to solve this problem were reviewed in the report of the "rabbit bleb" technique (*1*). The latter is a successful but somewhat expensive and cumbersome procedure. The purpose of the present paper is to describe a simple technique using a membrane of baby chick skin for the artificial feeding of human body lice, *Pediculus humanus corporis*, and to record infection of this species with three pathogenic microorganisms, *Rickettsia prowazeki, R. mooseri*, and *Borrelia novyi*, by the new technique.

Method

The method involves preparing a piece of skin from a baby chick, attaching this membrane to a small cylinder, placing the cylinder in a beaker containing the desired meal for the lice, and putting the lice onto the membrane. These steps are described below.

Preparing the Membrane. Most of our membranes have been prepared from chicks varying in age from 1 to 7 days. Although 1-month-old chicks are equally useful, the upper age limit which is satisfactory has not been determined; a single trial with the skin of

*Department of Public Health Bacteriology, Harvard University School of Public Health, Boston, Mass. This work was supported by a grant from the Division of Research Grants and Fellowships of the National Institutes of Health, Public Health Service, and was conducted with the aid of the Commission on Virus and Rickettsial Diseases, Army Epidemiological Board, Office of the Surgeon General, United States Army, Washington, D C.

an adult chicken was unsuccessful. The thickness of the skin may be the determining factor. Apparently the breed of chick is unimportant since we have used skin from several breeds including White Leghorn, and a mixed strain of undetermined origin. If it is inconvenient to use the skin soon after the chick is killed, the bird can be stored in the refrigerator for at least 7 days, possibly longer, and lice will feed quite satisfactorily through a membrane prepared from its skin. Uncontaminated, essentially sterile skin can be obtained by disinfecting the surface of an egg which is "approaching term" and allowing the chick to hatch under aseptic conditions. The chick is etherized and the down is removed from its side and breast. Plucking is inadvisable as the skin may be torn. Clipping is satisfactory, although if too much down remains it is difficult and time consuming to remove lice after they have fed. A depilatory containing barium sulfide has been used with success when the skin was washed after application; the residual odor apparently does not repel lice. When one is providing a meal containing pathogenic organisms, clipping is preferable since it avoids any possible deleterious effect of the depilatory upon the pathogen. Further preparation consists in swabbing the skin with 70 percent alcohol followed by acetone for partial cleansing and antisepsis.

Attaching Membrane to Cylinder. The prepared skin is then stretched over one end of a cylinder of glass, celluloid, or metal with the downy surface facing the inside of the cylinder. It may be attached before removal from the chick by use of Duco waterproof cement provided that sufficient time is allowed for the evaporation of volatile solvents which are toxic and/or repellent to lice. A metal ring is more satisfactory for attachment of skin to the cylinder because it can be sterilized and slipped under the skin through an incision, after which the cylinder is tightly clamped into the ring. A split ring with some degree of spring to it is quite useful for this purpose. Paraffin wax is applied to the junction of skin and cylinder to prevent leakage.

Placing Cylinder in Beaker Containing Desired Meal. The cylinder with membrane attached is then lowered onto the surface of a layer of blood or other liquid in a beaker. This must be done immediately, for the lice feed irregularly and unsatisfactorily through a membrane which has been allowed to dry beforehand. A light cylinder and membrane may float on the surface; a heavy cylinder may be supported on glass beads which are added to the blood in the bottom of the beaker. The beaker is placed in a water bath at 36° C. and lowered so that the surface of the blood is at least 1 inch below the level of the water. Suitable precautions are taken to prevent contamination of the material in the beaker.

Adding the Lice. Lice can be added immediately, either individually, or in numbers on a piece of felt. They are taken from a normal

laboratory-reared colony of human body lice [1] maintained in the customary fashion (*2*). The lice leave the felt and many begin to feed within 5 to 15 minutes. The majority of lice of all stages of development complete their feeding in 30 to 45 minutes after being placed in the cylinder. They are then removed and stored at 32° C. between feedings.

Method for Feeding Minute Meal. Under certain circumstances it may be desirable to feed a minute quantity of blood or other material to a single louse or to several lice in succession. For this purpose the stem of a small glass funnel is shortened to 4 mm. in length and the membrane of chick skin is then stretched over the stem. The funnel is supported by a wire triangle and lowered onto the surface of the droplet contained in the depression of a cavity slide which is warmed by water in a Petri dish. A glass tube of small caliber would serve the purpose. The funnel, however, is more easily manipulated.

Temperature and Pressure. Although Buxton (*3*) has suggested that it is important to present the blood meal under slight pressure if human body lice are expected to feed, we have observed that lice complete the act of feeding through the membrane during the same interval which is required for engorgement on the intact skin of man or rabbit. For this reason, we have not attempted to supply the meal under pressure in our experiments. The temperature of the water bath appears to be an important element in successful artificial feeding, 36° C. being the optimum. In one series of observations when the temperature fell below 35° C., the lice fed irregularly. A few were observed to feed when the bath was at 33° C. Temperatures higher than 36° C. induce excessive activity on the part of the lice, and they do not feed well.

Mixtures Ingested by Lice Through Membrane. Various mixtures have been ingested through the membrane. In one experiment a colony of normal lice was maintained for 14 days by feeding on defibrinated human blood. Single meals have been given to various batches of lice in which the material was heparinized human plasma, defibrinated human blood mixed with defibrinated rat blood, or defibrinated human blood mixed with yolk sac suspensions prepared in buffered saline. After a single meal of these mixtures the lice fed in the usual manner through the membrane on defibrinated human or rabbit blood *in vitro*, or on the intact skin of man or rabbit. It is interesting that laked human blood is readily ingested. This makes it possible to feed samples which have been stored at subfreezing temperatures and subsequently thawed. However, a meal of laked blood apparently tends to cause rupture of the intestine in a few of of the lice which feed upon this material. To allow for this loss,

[1] We are indebted to the U. S. Department of Agriculture, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine, Orlando, Fla., for specimens of their normal colony of human body lice from which we developed the colony used in these experiments.

several additional lice must be included in a particular batch in order to have an adequate number of survivors several days later.

Infection of Lice by Membrane Technique

Preliminary studies in the application of this technique have been promising. Batches of lice have been infected by the oral route with three pathogenic micro-organisms.

Rickettsiae. Artificial infection was accomplished by offering a single infective meal composed of defibrinated human blood mixed with a suitable dilution of a yolk sac suspension of the Breinl strain of epidemic typhus in one series of experiments and the Wilmington strain of murine typhus in another. After the initial infective meal, the batches of lice were fed once daily upon separate rabbits unless otherwise stated. Control lice which had fed upon a mixture of equal parts of defibrinated human blood and the buffered saline diluent were followed in the same manner.

R. prowazeki. In a preliminary experiment, smears of the intestines of lice were made 96 hours after the infective meal and stained by Macchiavello's method. The presence of relatively large numbers of typical rickettsiae in these smears indicated that multiplication had occurred in the lice. No rickettsiae were observed in the control lice.

A second batch of lice, mainly third instars, was offered a meal composed of defibrinated human blood mixed with an equal quantity of a yolk sac suspension of epidemic typhus rickettsiae diluted to 10^{-3} in buffered saline. After this infective meal, the lice were fed twice daily upon a rabbit. Smears of intestines of lice dying on the 4th, 5th, and 6th days following the infective meal showed massive infections with typical rickettsiae. On the 6th day, five lice were sacrificed separately and the intestines removed from the body. Smears of a portion of each intestine were positive. The remainders of the intestines were pooled and ground in buffered saline. The volume of the original suspension being 5 milliliters, the dilution was equivalent to 10^{-1}, since 10 lice per milliliter would be arbitrarily regarded as equivalent to 10^{0}. Serial ten-fold dilutions of this suspension were inoculated in dosages of 0.25 milliliters into cotton rats by the intra-abdominal route. When challenged 3 weeks later with the homologous strain, as described elsewhere (*4*), the final end-point of the immunizing dose was found to be approximately $10^{-6.5}$. This result provided evidence of multiplication of the rickettsiae within the lice, as well as evidence of their probable identity with the organisms contained in the original meal.

R. mooseri. In a preliminary experiment countless rickettsiae were observed in smears of the intestines of infected adult lice killed 120 hours after ingestion of an infective meal. No rickettsiae were observed in the control lice.

A second batch of lice, mainly third instars, was offered a meal composed of a yolk sac suspension of murine typhus rickettsiae, diluted to 10^{-2} in buffered saline, mixed with an equal quantity of defibrinated human blood. After this infective meal the lice were fed twice daily upon a rabbit. Smears of intestines of lice dying on the 6th, 7th, 8th, 11th, and 13th days showed massive infections with typical rickettsiae. On the 13th day, five lice were sacrificed separately and the intestines removed from the body. Smears of each intestine were positive. The remainders of the intestines were pooled and ground in buffered saline. Cotton rats were inoculated with serial ten-fold dilutions of this suspension as described above for lice infected with epidemic typhus. When challenged with the homologous strain the 50 percent end-point of the immunizing dose was found to be a dilution of 10^{-6}, providing evidence of multiplication of the rickettsiae within the lice, as well as evidence of their probable identity.

Borrelia novyi.[2] Another batch of lice was fed upon defibrinated human blood mixed with an equal volume of heparinized blood of a rat which had been inoculated intra-abdominally with *Borrelia novyi* 48 hours previously. The undiluted blood of this rat contained approximately one organism per erythrocyte in a Giemsa-stained smear. Control lice were fed upon defibrinated human blood mixed with an equal volume of normal rat blood. After the initial meal both the infected and control batches were maintained by single daily feedings through the membrane upon normal defibrinated human blood. The mortality rates in the two groups were comparable. Spirochetes were first demonstrated in Giemsa-stained smears of a louse crushed 72 hours after the infective meal. They were subsequently observed by dark-field examination in lice sacrificed daily from the 4th to the 8th day, when the experiment was terminated. Increase in numbers of spirochetes was apparently taking place, since dense bundles of very active organisms were frequently observed in fresh preparations. Furthermore, the organisms had definitely changed in appearance, becoming longer and more delicate than those observed in the blood of the infected rat. This phenomenon has been described by other workers using strains known to be infective for lice.

Discussion

The fact that most of the lice feed quickly after being placed on the membrane of chick skin is obviously advantageous. If it is desired to provide an infective meal containing estimated numbers of micro-organisms, this can be readily accomplished since there probably is little loss in viability of most micro-organisms in the short period

[2] We are indebted to Dr. Quentin M. Geiman, Assistant Professor of Tropical Diseases, Harvard School of Public Health, for supplying us with *B. novyi* and for technical advice and assistance in studying the infection in lice and in laboratory animals.

during which lice take a meal through the membrane. Another advantage of the technique is that the infectivity of the meal can be determined before and after feeding if this is desired.

Several applications of the technique have been considered, such as its usefulness in studying the effects of serial passage in lice on strains of rickettsiae and *Borrelia*. Further study may show the survival and multiplication of *B. novyi* in the body louse to be of significance with regard to the ultimate origin of this strain, for it has never been clear how the patient from whom the strain was recovered acquired his infection in the first place. The value of the method is being explored in relation to the detection of small numbers of rickettsiae, since it is possible that a louse may be infected by smaller numbers of rickettsiae than are required to induce immunity in the usual experimental laboratory animal.

Other applications of the method suggest themselves. We have maintained a small colony of lice for 2 weeks by artificial feeding and it seems possible that, with modifications, a colony might be maintained indefinitely in this manner. The method seems admirably suited to a study of the nutritional requirements of the human body louse. One might perform controlled investigations of the conditions under which lice will or will not feed. The effects of ingestion of various kinds of blood could be determined. One could easily study the effect of ingestion of blood containing measured quantities of toxicant drugs.

The principal disadvantage of the membrane technique lies in the difficulty of sterilization of skin of any sort.

Summary

A description is given of a simple technique for the artificial feeding and infection of the human body louse using a membrane prepared from the skin of a baby chick. Advantages and disadvantages of the technique have been described. Human body lice have been infected with *R. prowazeki*, *R. mooseri*, and *Borrelia novyi* by this method. Other applications of the technique are suggested, some of which are being investigated.

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Health Is Everybody's Business

By Mayhew Derryberry, Ph. D.*

Not so long ago, one of the outstanding leaders of public health said, "You know I used to think that the main purpose for bringing the community into the program was to get support for the activities we wanted to carry out." This statement typifies the public health thinking of a quarter of a century ago. Professional workers carefully studied the situation, developed a program which they considered good for the people, and then tried to obtain their support. Public health leaders were afraid to give citizens too much, if any, voice in the development of the program for fear they might want to do something the experts didn't think right. Frequently, such statements as the following were made: "Laymen get too enthusiastic and move too fast." "They are uninformed and demand things we can't do."

So long as the professional health workers could provide mass disease control through some activity of their own, like providing a clean and safe milk and water supply, or adequate sewage disposal, such an attitude did not detract from public health progress.

But today, the problems are changed, and the interests of citizens are becoming more intimately concerned with health. How to capitalize on this interest and bring about constructive group thinking and planning by the citizens is a major task for public health workers.

The problem has at least two important aspects:

1. How to involve large groups of people with varying backgrounds, interests and experience in working harmoniously together.

2. How to change the attitude of professional public health workers so that they will aid group thinking and planning by citizens for improvement of their own health.

Some suggestions for working out these two problems may be gleaned from the experimental programs conducted by social psychologists, adult educators, industrial relations officers, and workers in community organization and social group work.

1. *The first and most important step in group planning by citizens is that the problem to be worked on should be selected by them, and be one that a majority of the members of the group feel is important*

Too often in the past the problem has been one selected by professional workers. But are the people always interested in the prob-

* Chief, Division of Public Health Education, Public Health Service. This paper was read before the Annual Meeting of the Health Council of Greater New York, Inc., New York City, April 1949.

lems proposed by the public health profession? It is difficult to interest an individual in having a careful periodic medical examination for the protection of his health in the future when he has a throbbing toothache. Groups frequently can't be interested in preschool health programs when the filth around them is the problem that is disturbing them most. The immediate problem selected must be the one which the people recognize as important.

Sometimes the problem has been determined by a superficial annoyance of one citizen who is determined to dominate and have his problem solved, regardless of group concerns. This is not an easy situation to handle, but as groups become more skilled in working together, they will be able to avoid the pitfall of satisfying only a domineering citizen.

The most usual method of problem selection begins with a survey, sometimes conducted by experts, but preferably conducted by the citizens themselves. All too often, however, the completion of the survey, making of recommendations, and printing of the report (to adorn library shelves) are accepted as the solution of the problem. A recommendation is made that somebody else do something and through that method those who should take action wash their hands of any further responsibility. If surveys are to be used, the people should make the survey, or at least frame the recommendations for the action they will take.

The social psychologists suggest a problem census as the method for selecting a problem on which to work, that is, listing all the problems with which the various group members are concerned. Professional workers are always afraid that the laymen are not aware of the important problems. Actually in any such compilation made by interested citizens, the entire gamut of health problems will always be covered. From the listed problems priorities can be established through group decision.

2. *The goal to be achieved with reference to any problem must be realistic, and not visionary and entirely idealistic*

In determining a realistic goal, it is necessary to appraise carefully the resources available to the group. Individuals and organizations must be given the opportunity to define their own level of participation. How may of us have seen Mr. or Mrs. Fix-it who alienated many potential workers on a project by saying, "I have it all worked out. Mrs. Jones, you do this; Mr. Smith, your organization can do this." The hostile reactions to such a person need not be described. The only resources consistently available on any project are those that are volunteered. It is the job of the professional health worker to secure maximum volunteer participation.

Not only must the positive resources available be appraised, but there must also be a clear delineation of the factors in the situation that will interfere with achievement of the goal. For example, cultural and traditional food patterns need to be carefully considered in any program of improving nutrition. We learned this lesson in the war, and seldom now do we hear the comment in regard to immigrants' foodways, "I just can't get those people to eat an American diet." We learned then that the supplementation of the diets of various cultures was what was needed, rather than the standard (American) dietary pattern.

Another factor that must never be overlooked is organized opposition. Dr. Florence Sabin tells the story of her work in Colorado and how the people had worked for passage of a certain law. Because they had not foreseen that the law would be opposed by a particular group within the State, the law failed of passage. How to cope with pressure groups is a long story in itself, but as citizen groups gain more skill in democratic planning and action for the welfare of all the people, the influence of organized opposition will decline.

Still another consideration in the selection of a realistic goal is the need for some success early in the period of working together. It is far better to get a vacant lot cleaned up as a first step toward more vital citizen participation in health activities than to attempt to get every expectant mother under medical care when there are not sufficient doctors to give the care. The first success will give skill in working together so that more difficult problems can be attacked over longer periods of time.

Citizens can be aided in their selection of a realistic goal if they call in as technical advisers the professional experts in the field. The experts can give information, describe the limitations of various procedures, perhaps even suggest other goals, but they do not tell the citizens what to select.

3. *The third step is the development of a workable plan*

When all the people have been involved in both the selection of the problem and the definition of the goal, they naturally will be in on the planning. Too often the first time all the people are brought in is after the plan has been developed, either by a professional worker, a voluntary agency, or a dynamic community "do-gooder." One of the reasons for not including everyone during the development of plans is the desire for credit by those who take over the planning function. Recently a national organization, which shall be designated by "X," developed a plan suggesting that the local chapters should get the cooperation of all other interested agencies in communities in carrying out the plan, but also cautioning that the program must be kept an "X" organization project.

Perhaps we should take a hint from the Japanese Diet. It is said that each member of the Diet expresses his opinion as to how a given problem should be solved. Once having given his opinion, he no longer claims it as his own; it becomes the property of the group. From all the ideas proposed a plan is eventually adopted which represents a universal group decision. If the plan should fail, the group and not any one individual is responsible for its failure. It is too dangerous for an individual to be responsible for the plan, because a failure of the plan would require that the individual commit hara-kiri. In addition, the proposal is more likely to succeed because it has the backing of the entire group.

Ivah Deering in her book, Let's Try Thinking, says, "To think (a problem) through within and with the assistance of the group is to build under subsequent action a foundation which will stand greater storms and stresses, for it is made up of understanding, cooperation, and common effort." Therefore, if we want all the people to contribute more effectively to the total community health, we must find ways to let them do the planning.

4. *The fourth step is action*

Nothing is harder for a group to do than to get into action. Of course, if members of the group have been involved in the three enumerated steps above, they are much more likely to take action. Suggested aids for getting into gear are: (a) The group should commit itself both collectively and as individuals to do some specific thing; (b) there should be a time limit set; (c) the action to be taken should not require too long a time before the group reassembles to consider progress and further steps; (d) if possible every member should get some feeling of success.

5. *The results of the action must be objectively evaluated*

Quite often, and rightly so, at the completion of some project or community action there is a "success banquet." Such occasions serve a very valuable purpose, but should there not also be a much more soul-searching session? Perhaps the celebration is for publicity purposes, but if citizens are to get more skill in solving health problems, should they not be willing to look back objectively on past performance and evaluate it, not so much in terms of the actual achievement as in terms of the process they followed? What were the steps they took that were most helpful in achieving the goal, and what did they do that could be improved? Did they have too many meetings or too few? Did they move into action without adequate plans? Did they have the best technical advice they could obtain? Did they use it in the best manner and at the right time? Were all the people

aware of the problem, and did they have opportunity to participate in the planning as well as in the action? Only through such careful study (introspection, if you will) of the methods they used to work together, and the reactions of all the people towards the procedure and toward one another can they learn to increase the quality and amount of improvement in health through participation.

All the suggestions above have been directed primarily towards the ways in which citizens can effectively make health their business. Occasionally, reference has been made to the expert, or professional health worker, but only incidentally. Now let's turn our attention to those in that category and see what suggestions there are for them.

First, it may be said that the role professional workers play cannot be as clearly delineated. But there are some attitudes we should possess:

1. We must have faith, yes, even a conviction, that every citizen has a potential contribution to make for the betterment of his community. The quality and amount of the contribution may be great or small, but regardless of its magnitude or quality every opportunity should be given for the contribution to be made. It is our job to help uncover any hidden resources that may reside in people and to help them make their maximum contribution.

2. We must have faith in the democratic principle that the decisions of an informed majority are right. We must have that faith even though the decisions made by a group do not conform with our own opinions. If it is in our field of expertness, then we can only attribute the decision, which we may consider incorrect, as being our failure to provide adequate information, or if we are truly objective and honest, perhaps we would face the possibility that we might be wrong. Sometimes professional persons overlook the fact that they are subject to human errors of judgment.

3. We must have faith that a group thinking together and utilizing the contributions that all can make, can produce more and better results than can any one individual in the group working alone.

Even though we repeat that we have profound faith in the group, we often act as if we did not believe our own words. A reason for this inconsistency may be that most groups have not developed skill in the mechanics of working together productively. Furthermore, most individuals with training in special fields know very little about how to guide a group toward the expression of its ideas. Because professional leaders become over-protective, they often fail to give the group a chance to practice independent thinking. Our job is not merely one of making special resources of information available to others. Our job is also to help the group to work effectively. This is a problem all its own.

4. We must be sufficiently patient to let a group take such time as is necessary to arrive at its conclusions. If information is given too quickly, the group may be pushed into indecision.

5. We must develop insight and an understanding of interpersonal and intergroup relations so that we can help individuals and groups get satisfaction from their participation, and increase their own feeling of worth among their fellow men. The studies of social psychologists are constantly enriching our knowledge of human motivation. Again and again psychological research underlines the power of the need to be approved by one's associates.

6. We must coordinate our services and activities in order that we will not duplicate services or compete with one another in the field. Too few professional workers are available for us to waste their time and effort by using several persons to do what can be done by one with adequate planning. Certainly we should not tolerate duplication. Sharing responsibilities and services is one of the skills we must improve.

All over the country, citizens are becoming more and more concerned in the health of the Nation. A few suggestions for making that concern more productive in terms of community action, using the skills and abilities of all people, lay and professional, have been discussed. It is hoped that putting the suggestions in organized form might stimulate wider and more intensive activity in the future.

Summary

1. Wider group participation in planning for health is contingent upon (a) developing group experience in cooperative action, and (b) educating professional public health workers in methods of securing such action from groups.

2. Members of the group should select their own problems.

3. The group's goal should be defined realistically and achieved by a program that is practical.

4. The methods employed in securing group action should be analyzed when the program is completed.

5. Professional health workers must have sincere faith, practiced as well as voiced, in the worth of methods of democratic action.

6. They must increasingly strive to learn to deal with groups as an integral aspect of their own professional skills.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 24, 1949

A decline was reported in the incidence of poliomyelitis from a total of 2,624 cases last week to 2,192 currently—a decrease of 432 cases, or approximately 16.5 percent. This is the largest percentage weekly decline recorded since the peak of incidence was reached with a total of 3,419 cases reported for the week ended August 20. A total of 1,606 cases, representing a decline of 12.7 percent, was reported for the corresponding week last year, and the 5-year median for the week is 1,158. Of the current total, 1,553 cases (70 percent) occurred in the New England, Middle Atlantic, and North Central areas. Decreases were recorded in all geographic divisions except the South Central. Increases, none more than 15 except in Texas and Wisconsin, and totaling 129 cases, were reported in 11 States.

The 26 States reporting 20 or more cases currently, are as follows (last week's figures in parentheses): *Increases*—Wisconsin 87 (64), Nebraska 51 (46), West Virginia 20 (18), Kentucky 47 (32), Arkansas 26 (25), Texas 90 (52), Utah 30 (18), Washington 44 (39); *decreases*—Maine 24 (50), Massachusetts 143 (165), Connecticut 32 (56), New York 288 (354), New Jersey 91 (127), Pennsylvania 59 (64), Ohio 125 (146), Indiana 35 (68), Illinois 135 (196), Michigan 170 (208), Minnesota 121 (150), Iowa 44 (64), Missouri 54 (60), Kansas 32 (51), Tennessee 22 (27), Oklahoma 43 (50), Colorado 33 (54), California 122 (127). The total for the year to date is 31,289, as compared with 17,646 for the corresponding period last year and a 5-year median of 13,570.

During the week, 1 case of smallpox was reported, in Montana, and 11 cases of Rocky Mountain spotted fever were reported, in 9 States. Of 23 cases of infectious encephalitis in 8 States, 13 were reported in North Dakota.

A total of 8,640 deaths was recorded during the week in 94 large cities in the United States, as compared with 8,508 last week, 8,079 and 8,201, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,201. The total for the year to date is 349,323, as compared with 351,463 for the corresponding period last year. Infant deaths totaled 709, last week 640, 3-year median 651. The cumulative figure is 24,857, same period last year 25,448.

Telegraphic case reports from State health officers for week ended September 24, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	2	------	------	4	------	2	24	------	3	------	------	------	18	------
New Hampshire	------	------	------	------	------	------	13	------	------	------	------	------	------	------
Vermont	------	------	------	2	------	------	2	------	------	------	------	------	------	------
Massachusetts	------	------	------	11	1	------	143	------	16	------	------	------	136	------
Rhode Island	------	------	------	------	------	------	13	------	------	------	------	------	7	------
Connecticut	------	------	------	6	1	28	32	------	2	------	------	------	32	------
MIDDLE ATLANTIC														
New York	2	------	(c)	43	2	122	288	1	[d] 27	------	------	8	181	21
New Jersey	2	------	2	8	1	57	91	------	7	------	------	2	101	1
Pennsylvania	3	------	(c)	26	5	53	59	------	25	------	1	3	119	------
EAST NORTH CENTRAL														
Ohio	5	------	1	16	2	18	125	1	35	------	------	11	79	10
Indiana	15	1	4	2	------	10	35	------	10	------	------	2	9	------
Illinois	2	2	------	7	5	39	135	------	12	------	2	2	92	------
Michigan [a]	3	1	5	28	2	56	170	------	21	------	------	2	141	1
Wisconsin	------	------	------	70	------	3	87	------	9	------	------	------	86	------
WEST NORTH CENTRAL														
Minnesota	1	------	------	7	2	4	121	------	9	------	------	------	7	------
Iowa	------	------	------	7	------	1	41	------	5	------	------	------	2	10
Missouri	9	------	1	3	3	21	51	------	6	------	2	8	8	------
North Dakota	1	13	12	12	------	------	16	------	1	------	------	------	1	------
South Dakota	1	1	------	------	2	------	18	------	------	------	------	------	2	------
Nebraska	------	------	8	2	------	2	51	------	13	------	------	------	6	------
Kansas	------	------	1	1	------	7	32	------	6	------	------	------	2	------
SOUTH ATLANTIC														
Delaware	------	------	------	------	1	------	------	------	1	------	------	------	14	------
Maryland [a]	1	------	------	4	1	11	[1] 18	2	[d] 8	------	1	2	42	------
District of Columbia	------	------	------	1	------	5	3	------	1	------	------	------	4	------
Virginia	6	------	110	5	1	33	13	------	24	------	1	3	15	4
West Virginia	11	------	8	13	1	4	20	------	9	------	------	7	2	------
North Carolina	19	------	------	8	2	------	7	1	42	------	------	1	22	------
South Carolina	6	------	------	1	------	10	5	1	5	------	1	------	------	4
Georgia	13	------	5	------	1	6	4	------	12	------	1	4	------	11
Florida	3	------	1	1	------	7	13	------	3	------	2	4	2	------

EAST SOUTH CENTRAL														
Kentucky	5	-	-	2	2	11	47	1	19	-	-	6	21	2
Tennessee	5	-	26	8	4	29	22	-	28	-	-	7	16	-
Alabama	14	-	12	4	1	31	8	-	16	-	-	1	1	8
Mississippi [a]	7	-	4	5	-	12	10	-	14	-	-	2	3	-
WEST SOUTH CENTRAL														
Arkansas	4	-	1	1	-	9	26	2	1	-	6	2	8	1
Louisiana	3	-	-	9	-	12	14	-	2	-	-	5	1	-
Oklahoma	2	1	31	-	-	11	43	-	1	-	-	1	1	-
Texas	15	-	531	31	5	107	90	-	6	-	-	7	85	7
MOUNTAIN														
Montana	1	-	4	10	-	-	10	-	-	1	-	-	-	-
Idaho	1	-	1	2	-	1	15	1	[d] 4	-	-	-	4	-
Wyoming	-	-	.	2	-	-	7	-	-	-	-	-	1	-
Colorado	-	3	9	2	-	9	33	-	3	-	-	1	9	-
New Mexico	1	-	-	6	-	6	11	-	1	-	-	5	2	-
Arizona	-	-	20	11	-	7	11	-	-	-	-	-	5	-
Utah [a]	-	-	1	7	-	1	30	1	1	-	1	-	13	-
Nevada	1	-	-	-	1	-	-	-	-	-	-	-	-	-
PACIFIC														
Washington	-	-	8	25	-	6	44	-	13	-	-	-	15	-
Oregon	-	-	7	9	-	10	13	-	5	-	-	3	18	-
California	9	1	4	42	2	19	122	-	[d] 33	-	-	5	141	-
Total	173	23	812	464	48	870	2,192	11	462	1	18	104	1,477	-
Median, 1944-48	295	22	767	540	69	-	1,158	11	765	2	13	114	1,862	-
Year to date 38 weeks	5,070	533	80,675	589,895	2,564	59,731	[f] 31,289	521	6,089	43	905	2,811	45,181	-
Median, 1944-48	8,077	455	194,853	553,666	4,735	-	13,570	489	89,992	279	697	3,114	74,147	-
Seasonal low week ends	(27th) July 9	-	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	-	(11th) Mar. 19	-	(32nd) Aug. 13	(35th) Sept. 3	-	(11th) Mar. 19	(39th) Oct. 2	-
Since seasonal low week	1,302	-	4,808	1,377	48	-	[f] 30,373	-	1,829	2	-	2,351	55,214	-
Median, 1944-45 to 1948-49 [b]	2,361	-	4,656	1,569	69	-	13,307	-	3,697	6	-	2,639	100,643	-

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for whooping cough, the corresponding periods are 1943-44 to 1947-48.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately as follows: New York 1, Georgia 1, Florida 1, Mississippi 1, Louisiana 2, California 4. Cases reported as Salmonella infection, not included in the table, were as follows: New York 1.
[f] Poliomyelitis, delayed reports: Maryland, July, 1 case, August, 5 cases.
Alaska: Measles 9.
Hawaii Territory: Diphtheria 1, measles 1, lobar pneumonia 1, poliomyelitis 1. Deduction, poliomyelitis, 1 case reported week ended September 10.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—July 1949.—During the month of July 1949, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	12		6		13		7		38	
Diphtheria	1						1		5	
Dysentery:										
Amebic	2						6		8	
Bacillary			2		1		2		5	
German measles	1				1				2	
Hepatitis, infectious					2		2		4	
Influenza		1		1						2
Leprosy	1					1	1		2	1
Malaria [2]	1				15	1	45	2	61	3
Measles			3						3	
Meningitis, meningococcal		1								1
Mumps					2				2	
Pneumonia		9			26	2		8	[3] 26	19
Poliomyelitis							[4] 2		[4] 2	
Relapsing fever							2		2	
Tetanus	1								1	
Tuberculosis		18		4	3			7	[3] 3	29
Typhoid fever							2		2	
Typhus fever (murine)	4								4	
Yaws	1						1		2	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 2 recurrent cases.
[3] Reported in the Canal Zone only.
[4] The two poliomyelitis cases reported were contracted in Guatemala and flown to the Canal Zone for specific therapy.

Puerto Rico

Notifiable diseases—4 weeks ended August 27, 1949.—During the 4 weeks ended August 27, 1949, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	20	Syphilis	55
Diphtheria	44	Tetanus	15
Dysentery	3	Tetanus, infantile	1
Gonorrhea	73	Tuberculosis (all forms)	344
Influenza	8,190	Typhoid fever	7
Malaria	16	Typhus fever (murine)	5
Measles	4	Whooping cough	98
Poliomyelitis	2		

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended September 3, 1949.—During the week ended September 3, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			3		9	21	5	26	9	11	84
Diphtheria				2	1	1	1				5
Dysentery:											
Amebic								1			1
Bacillary					3	2					5
Encephalitis, infectious						1	6	1			8
German measles			4		2	6	1		6	1	20
Influenza			1			3	1				5
Measles	1		2		18	21	10	48	42	60	202
Meningitis, meningococcal			1		1	1		1			4
Mumps			26		3	35		21	5	7	97
Poliomyelitis	1		6	1	28	79	8	12	11	20	165
Scarlet fever				2	10	5	1	6	10	6	40
Tuberculosis (all forms)			5	6	106	20	73	13	27	24	274
Typhoid and paratyphoid fever					11	3		1	1	11	27
Undulant fever					1	1					2
Venereal diseases:											
Gonorrhea	6		14	9	87	76	26	22	59	90	389
Syphilis			2	10	84	23	8	10	8	8	153
Whooping cough	1				49	40	1		11	1	103

JAMAICA

Notifiable diseases—4 weeks ended August 27, 1949.—For the 4 weeks ended August 27, 1949, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localites
Cerebrospinal meningitis		1	Scarlet fever		2
Chickenpox	2	13	Tuberculosis (pulmonary)	38	50
Diphtheria	4		Typhoid fever	5	51
Puerperal sepsis		1	Typhus fever (murine)	1	

KOREA

Encephalitis.—According to information dated September 12, 1949, the Korean Health Ministry considered the recent outbreak of encephalitis in Korea (see PUBLIC HEALTH REPORTS, September 30, 1949) to have passed the peak about September 9, although the inci-

dence is still regarded as dangerously high. The total number of cases and deaths reported from the beginning of the outbreak through September 11, was 2,042 cases, 517 deaths, of which 821 cases, 104 deaths occurred in Seoul. Later information states that during the period September 12–18, 1,484 cases with 538 deaths were reported, including 320 cases, 20 deaths in Seoul.

NEW ZEALAND

Notifiable diseases—4 weeks ended August 27, 1949.—During the 4 weeks ended August 27, 1949, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	13	1	Influenza	1	1
Diphtheria	12	1	Malaria	1	
Dysentery:			Poliomyelitis	2	
Amebic	6		Puerperal fever	2	
Bacillary	2	1	Scarlet fever	73	
Encephalitis, lethargic	1		Tuberculosis (all forms)	151	53
Erysipelas	11		Typhoid fever	9	
Food poisoning	7		Undulant fever	4	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma—Bassein.—On May 8, 1949, the town and port of Bassein, Burma, was declared infected with cholera, due to an outbreak of that disease in refugee camps there. Cases and deaths reported since May 1 are as follows: May 1–31, 122 cases, 78 deaths; June 1–30, 36 cases, 12 deaths; July 1–10, 11 cases, 5 deaths. According to information dated August 23, 1949, as no new cases were reported after July 7, the town and port was declared free from cholera as of August 7, 1949.

Pakistan—Lahore.—During the week ended September 10, 1949, 9 cases of cholera were reported in Lahore, Pakistan.

Plague

Union of South Africa.—Plague has been reported in Union of South Africa as follows: In Cape Province—week ended August 27, 1949, 1 fatal case in Vanzylsrust Area, Kuruman District, week ended Septem-

ber, 3, 1 fatal case at Kop Farm, Gordonia District, week ended September 10, 3 cases, 2 deaths (pneumonic) at Goras Farm, Hay District; in Orange Free State—week ended September 3, 2 cases, 1 death, at LaRochelle Farm, Vredefort District.

Smallpox

Argentina—Buenos Aires.—During the week ended September 10, 1949, 11 cases of smallpox (mild type) were reported in Buenos Aires, Argentina.

Typhus Fever

Czechoslovakia.—Correction: The report of 24 cases of typhus fever in Czechoslovakia for the week ended August 13, 1949, (see PUBLIC HEALTH REPORTS, September 23, 1949) was in error. No cases of typhus fever were reported in Czechoslovakia during that week.

Spain.—During the week ended August 13, 1949, 2 cases of typhus fever, 1 fatal, were reported in Spain. The fatal case was reported in the city of Madrid.

Yellow Fever

Panama—Colon Province.—On September 10, 1949, 1 death from yellow fever was reported in Buena Vista, Province of Colon, Panama. This is the third case reported in the same area in a 6-week period.

DEATHS DURING WEEK ENDED SEPT. 17, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Sept. 17, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,508	8,208
Median for 3 prior years	8,267	
Total deaths, first 37 weeks of year	340,683	343,384
Deaths under 1 year of age	640	609
Median for 3 prior years	701	
Deaths under 1 year of age, first 37 weeks of year	24,148	24,797
Data from industrial insurance companies:		
Policies in force	70,143,481	70,883,764
Number of death claims	11,757	12,812
Death claims for 1,000 policies in force, annual rate	8.7	9.5
Death claims per 1,000 policies, first 37 weeks of year, annual rate	9.2	9.5

Notifiable Diseases, Second Quarter, 1949[1]

The figures in the following table are the totals of the monthly morbidity reports received from State health authorities for April, May, and June 1949, and show the numbers of cases reported by the required reporting sources in the respective States. They are preliminary and are subject to correction by final reports. They may be assumed to represent the civilian population only, although in some instances a few cases in the military population may be included. The comparisons made are with similar preliminary reports; but owing to population shifts in many States since the 1940 census, the figures for some States may not be comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State, although some do not do so. The list of diseases required to be reported is not the same for each State. Only a few of the common communicable diseases are notifiable in all the States. In some instances cases are reported, in some States, of diseases that are not required by law or regulation to be reported and the figures are included although manifestly incomplete. There are also variations among the States in the degree of, and checks on, the completeness of reporting of cases of the notifiable diseases; therefore comparisons as between States may not be justified for certain diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as cancer, puerperal septicemia, rheumatic fever, and Vincent's infection, are not reportable. However, the figures are recorded as reported.

In spite of these and other deficiencies inherent in morbidity reporting, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating trends by providing a comparison with similar preliminary figures for prior years. The table gives a general picture of the geographic distribution of certain diseases, as the States are arranged by geographic areas.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated Monthly State Morbidity Reports for April, May, and June 1949

Division and State	Anthrax	Chickenpox	Conjunctivitis[2]	Diphtheria*	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria[3]	Measles*	Meningitis, meningococcal*	Mumps	Ophthalmia neonatorum	Pellagra	Pneumonia, all forms
NEW ENGLAND																		
Maine	-------	864	1	3	-------	4	-------	1	528	-------	1,151	-------	3,965	3	1,327	-------	-------	234
New Hampshire	-------	146	-------	-------	-------	-------	-------	-------	298	-------	15	-------	1,366	4	417	-------	-------	33
Vermont	-------	460	1	-------	-------	-------	-------	-------	393	-------	3	-------	1,678	5	653	-------	-------	25
Massachusetts	-------	6,696	-------	124	1	7	-------	7	2,918	-------	-------	4	7,581	12	3,407	37	-------	-------
Rhode Island	-------	460	1	4	-------	-------	-------	-------	14	-------	2	-------	1,710	-------	625	-------	-------	73
Connecticut	-------	2,490	14	57	4	1	-------	1	1,900	1	13	1	13,022	14	3,063	-------	-------	443
MIDDLE ATLANTIC																		
New York	11	11,840	4	61	207	202	-------	29	9,614	[4] 49	[4] 12	6	27,171	74	4,229	6	-------	3,016
New Jersey	1	14,981	-------	37	36	18	-------	7	5,847	-------	31	6	21,408	18	3,683	1	-------	620
Pennsylvania	5	8,750	-------	79	2	3	-------	5	2,221	-------	22	-------	26,341	66	6,541	9	-------	1,035
EAST NORTH CENTRAL																		
Ohio	-------	5,676	-------	62	5	4	-------	-------	2,196	-------	28	-------	16,917	57	5,480	114	-------	718
Indiana	-------	903	23	64	2	-------	-------	9	951	-------	11	-------	2,287	7	611	-------	-------	87
Illinois	-------	4,567	53	4	104	19	-------	12	4,200	1	80	[5] 2	3,479	49	3,063	18	-------	1,206
Michigan	-------	6,252	249	32	126	22	-------	24	5,585	13	18	-------	8,543	28	2,664	3	-------	581
Wisconsin	-------	8,643	-------	4	6	-------	-------	5	3,530	-------	136	-------	23,627	17	5,656	3	-------	[6] 51

WEST NORTH CENTRAL																		
Minnesota		1,137		15	16	10	2			3	10	8	1,604	16				124
Iowa		939	80	6	6			3	91				1,091	6	1,135			26
Missouri	4	944	1	20			3	1			30	1	2,562	16	651			180
North Dakota		63	2	2				4			53		418	7				185
South Dakota		78	2	3	1				1				676	1	223			12
Nebraska		456		4	1			1		1	61		1,883	2	845			10
Kansas		962	31	8				2	589		32		6,320	10	764		2	172
SOUTH ATLANTIC																		
Delaware		130		1				1	1				467	1	36			11
Maryland		1,072	1	27	2	1	8	1	631		12	1	2,757	6	289	2	1	315
District of Columbia		739		8	1	4						1	1,028	8				163
Virginia		1,732		30	4		627	2			1,882	4	10,504	23	672		1	669
West Virginia		346		15					421		61		1,031	6	523	25		56
North Carolina				54	2	2		1				7	9,840	27				
South Carolina		1,000		48	35	125		11	252	440	3,705	46	6,556	13	1,903	5	117	1,384
Georgia		760	7	27	8	248	3	2		1,116	199	35	5,018	11	971		17	636
Florida		1,520		42	45	24		6	22	2,183	50	10	2,142	21	697	3		181
EAST SOUTH CENTRAL																		
Kentucky		335	5	35	1	5		3	360	33	22	4	3,430	43	650			328
Tennessee		662		27	50	16	2	5	217		503	10	4,549	38	1,033	3	10	708
Alabama		626		37	12			1	11		1,300	37	4,497	22	505		3	651
Mississippi				41	18	26		2		543		10	1,097	15		4		303
WEST SOUTH CENTRAL																		
Arkansas		411		30	78	41	45		222	2	516	138	5,574	12	668	1	1	429
Louisiana		185		30	309				2	155	60	5	563	29	109		1	457
Oklahoma		490		13	66	5	6	3	338	7	268	33	4,204	12	1,180		3	309
Texas		[7] 7,430		226	154	6,821	2,197	13				943	21,926	83	[7] 5,283	52		3,377
MOUNTAIN																		
Montana		378	19	1				1	948		32		2,303	3	131			19
Idaho		335	39	5	1				179		121		1,717	1	276			62
Wyoming		360	2	3				1	64		1		242	2	154			85
Colorado		1,324		13	1	14			593		125		2,967	9	644			213
New Mexico		259		8	3	2	6	1	98		8		1,330	4	150	4	2	202
Arizona		669		16	34	403	123		416		578	4	1,644	3	462	1		158
Utah		1,206		4	[8] 14	2		1	239		7	[8] 2	1,287	1	461			[8] 29
Nevada		97	17				7				18	1	569	2	10			19
PACIFIC																		
Washington		2,118	70	18	9		63	1	1,367		66		5,511	16	1,471			200
Oregon		[7] 882	38	9	23	76	6						2,665	11	[7] 1,053			241
California		17,158		108	92	88		8	8,306		146	5	19,528	64	15,636	4		[6] 402
Total	21	119,531	660	1,465	1,479	8,202	3,098	175	55,863	4,547	11,388	1,324	298,745	898	80,004	295	158	20,438
Second quarter 1948	18	113,339	452	1,777	1,185	5,878	2,691	115	8,909	4,839	17,977	2,788	326,736	856	103,782	215	311	19,601
Median 1944-48	12	108,042	[9] 429	2,353	809	8,148	1,905	115	13,623	4,121	21,338	14,363	289,410	1,407	73,375	384	1,075	22,628
Alaska		111							44		30		25	1	100			8
Hawaii Territory		889	19	3	1	16			51		15		1,741	1	246			[6] 7
Panama Canal Zone [10]		144		14	12	4			4		1	203	22	3	3			[11] 37

See footnotes on p. 1310.

Consolidated Monthly State Morbidity Reports for April, May, and June, 1949—Continued

Division and State	Poliomyelitis*	Rabies in man	Rheumatic fever	Rocky Mt. spotted fever	Scarlet fever*	Septic sore throat	Smallpox*	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms*	Tuberculosis, respiratory	Tularemia	Typhoid fever*	Paratyphoid fever	Typhus fever, endemic	Undulant fever*	Vincent's infection	Whooping Cough*
NEW ENGLAND																			
Maine	11		2		150	15					138	123		4	3		5		177
New Hampshire					132	21					48			1				6	82
Vermont	1				43	3								1				3	31
Massachusetts	40				1,680	22		3		3	703	740		13	9	1	8		1,136
Rhode Island	11		24		110	10				1	138	128		1	2				42
Connecticut	7				319	107		3		2	448	428	1	2	[14] 1		35		125
MIDDLE ATLANTIC																			
New York	33			2	[12] 2,001	([13])		4		52	3,975	3,064		23	[15] 17	1	38		1,902
New Jersey	26			10	1,015	51		4		10	842			6	13		13		749
Pennsylvania	17		258	8	2,251			1	1	1	1,306		3	30	[14] 14	1	197		1,138
EAST NORTH CENTRAL																			
Ohio	11		52	4	2,346	10		2	1	2				49			54	6	732
Indiana	14		11	4	500	8		4			641	380	9	12			15	2	210
Illinois	34	1	109	5	972	58		8	9	3	1,999	1,204	16	13		3	162	31	806
Michigan	27		227	1	2,966	419		5		2	1,295		1	9	[16] 13		59		419
Wisconsin	22				460	37					583	192	1	4			56		488
WEST NORTH CENTRAL																			
Minnesota	51		25		310	36		4			640		2	3	[16] 10		85		18
Iowa	26		3	2	158	16		2			273			1			98		34
Missouri	19			4	197	5	4	1	180		734		19	11	2		24		55
North Dakota	21		2		32						70	63	2	1	1		8	5	18
South Dakota	19			2	20		1		49		62	31		2			14	1	2
Nebraska	16				[13] 110	([13])			48		94			4			18	460	8
Kansas	19		6		119	2	3	2	2	1	245	183	1	4	1		35	11	81
SOUTH ATLANTIC																			
Delaware	12			2	70						89	89					1		20
Maryland	4		36	18	321	24				4	808	784		6			10	4	154
District of Columbia	3			1	69					1				2	5				17
Virginia	4		1	30	161	429				1	881	854	6	22	7	1	15		373
West Virginia	21		12		133	36			1		623	614		7	3		1		283
North Carolina	29			16	149	8					938	907	8	10	2	2	6		376
South Carolina	9		73	4	36	1,535		12			98		3	14	6	6	8		350
Georgia	16		19	6	93	35		3	1	1	800	669	18	17	25	47	46	10	66
Florida	48				68	27		21	12		1,055	1,055	8	17	[18] 34	20	20	21	40

EAST SOUTH CENTRAL																			
Kentucky	21	1	12	6	223	21	3	1	34		565	396		30		1	1	2	205
Tennessee	21		25	11	198	61		7	1		1,507		9	15	3	2	5	16	323
Alabama	37			2	88			8			600		4	18	1	35	16		139
Mississippi	56		17	2	52		3	6			778	755	10	13	2	4	17		89
WEST SOUTH CENTRAL																			
Arkansas	145		1	5	13	217		9	18		660	654	92	25	2	2	10		222
Louisiana	49		11	1	33	5		3			645	618	11	30	8	11	9		18
Oklahoma	137		18	5	70	109	2	2	55		674	665	16	10	[14] 2		37	165	37
Texas	571			1	333	1,272	4		8		1,387		24	77	17	90	99		1,482
MOUNTAIN																			
Montana	1		2	11	95	35			1		107	106	5	2					38
Idaho	34		11	5	29	100					23			5	2		11	12	31
Wyoming	5		55	12	20	1			2		13	1	9	2	1				7
Colorado	14		64	18	79	28	2			1	255		2	7	1		24	27	50
New Mexico	18		18		63	3	3	1	15		[8] 486	[8] 465		10	1		1		33
Arizona	14		35		80	358	1	1	89		604	569		9	3		8		103
Utah	[8] 34		18	[8] 3	68	33					[8] 48	[8] 44	8	[17] 1			[8] 26		300
Nevada	4				1	25					13		1		1			21	8
PACIFIC																			
Washington	27		76		270	21		2			587		1	1	[14] 2		6	31	163
Oregon	26		33	1	150	48			2		224	206		4	3		3		279
California	204	1	141	5	877	159	[18] 1	9	4	6	2,519	2,355		20	43	2	31		964
Total	1,989	3	1,487	207	19,748	5,410	27	128	533	91	31,311	18,951	290	568	[16] 260	229	1,335	834	14,423
Second quarter, 1948	1,790	9	1,338	178	22,637	4,348	12	96	387	171	37,531	19,638	285	725	192	260	1,307	436	21,934
Median, 1944–48	807	9	[9] 1,386	170	36,428	2,447	100	111	352	94	34,608	19,087	221	794	192	716	1,359	503	28,148
Alaska					4	5					250	236							
Hawaii Territory	6		1		1	1		1			192	183				2			1
Panama Canal Zone	[10] 4				1	1		3			[11] 5					6			[11] 1

See footnotes on p. 1310.

Footnotes for table on pages 1306 to 1309

*On the basis of information in the latest compilation of the reportable diseases in the several States (Pub. Health Rep., 59: 317-340, Mar. 10, 1944. Reprint No. 2544), diseases marked with an (*) are reportable by law or regulation in all States and the District of Columbia. Typhoid fever is reportable in all States, and paratyphoid fever in all but 6 States. A few States have begun to report paratyphoid fever as "salmonellosis." Syphilis is reportable in all States but is not included in the table, as more complete reports are issued later by the Division of Venereal Disease Control. Some States have increased and some have reduced the list of reportable diseases since the latest compilation cited above.

1 For report for first quarter of 1949 see p. 927 of the PUBLIC HEALTH REPORTS for July 22, 1949.
2 Includes cases of kerato- and suppurative conjunctivitis and of pink eye.
3 In a few States practically all cases contracted outside continental United States.
4 New York City only.
5 Exclusive of 10 cases of artificially induced malaria.
6 Lobar pneumonia only.
7 Figures taken from Weekly Mail Reports.
8 Includes nonresidents.
9 4-year average, 1945-48.
10 Includes the cities of Colon and Panama.
11 In the Canal Zone only.
12 Includes septic sore throat.
13 Included in scarlet fever.
14 Reported as "salmonella infection".
15 Cases in New York State reported as "salmonella infections, including paratyphoid fever"; cases in New York City reported as "paratyphoid fever".
16 Includes cases reported as salmonella infection.
17 Nonresident.
18 Imported.

The following list includes certain rare conditions, diseases of restricted geographical distribution, and those reportable in or reported by only a few States; last year's figures in parentheses (where no figures are given, no cases were reported last year, or the disease was not included in last year's published tabulation):

Actinomycosis: New Hampshire 1, New York 1 (2), Minnesota 1 (1), South Dakota 1 (3).
Botulism: Tennessee 1.
Cancer: Pennsylvania 1,979, North Dakota 172 (201), Kansas 1,035 (952), South Carolina 248 (423), Georgia 76 (49), Florida 552 (551), Kentucky 8 (2), Tennessee 921 (654), Alabama 1,059 (840), Arkansas 195 (193), Louisiana 583 (439), Montana 374 (198), Idaho 136 (248), Wyoming 119, Colorado 877, New Mexico 178 (114), Utah 46 (65), Nevada 1 (4).
Chagas disease: Panama Canal Zone 2.
Coccidioidomycosis: Arizona 18 (1), California 23 (16).
Colorado tick fever: Colorado 84 (52).
Dengue: South Carolina 2, Texas 18.
Dermatitis: New Hampshire 3 (31), Missouri 5 (5), Kentucky 17 (80) mycotic, Arkansas 1.
Diarrhea: Maine 1, New York 96 (14), Pennsylvania 34 (55) includes enteritis, Ohio 139 (120) includes enteritis, Indiana 1 (9), Illinois 12 (5), Michigan 18 (14), Minnesota 2 includes enteritis, Iowa 6, Maryland 10 (7), West Virginia 4 (1), South Carolina 2,606 (2,548), Florida 43 (38), Kentucky 1 (3), Oklahoma 1 (2), Texas 863, Idaho 31 (85) includes enteritis, New Mexico 12 (12), California 1 (12), Alaska 5 (25) includes enteritis.
Dog bite: Massachusetts 4,397, Pennsylvania 2,139, Illinois 4,977 (4,979) (and other animal bites), Michigan 3,386 (3,489), Arkansas 208 (248) (all animal bites).

Erysipelas: Connecticut 9 (6), Pennsylvania 21, Ohio 9 (8), Indiana 5 (4), Illinois 52 (48), Michigan 28 (27), Wisconsin 17 (17), Minnesota 2, Iowa 1, Missouri 1, North Dakota 2 (5), South Dakota 2 (3), Kansas 2 (3), Florida 5 (9), Tennessee 4 (5), Arkansas 5 (3), Montana 4 (4), Idaho 6 (3), Wyoming 1, Colorado 7 (13), Arizona 1, Utah 1 (1) Washington 6 (5) Oregon 18 (7), Alaska 2.
Food poisoning: Maine 57 (10), New York 188, Ohio 8 (4), Indiana 2, Illinois 271 (20), Minnesota 358 (34), Kansas 9, Florida 3, Louisiana 3 (2), Oklahoma 20 (50), Montana 2, Idaho 2, Colorado 1 (5), New Mexico 4 (6), Nevada 29, Washington 23 (20), Oregon 20, California 131 (246).
Granuloma inguinale: Florida 212 (182), Kentucky 1 (5), Tennessee 21 (20), Mississippi 36 (66), Louisiana 36 (43), California 4.
Granuloma unspecified: Connecticut 4.
Histoplasmosis: Tennessee 2.
Impetigo contagiosa: Connecticut 3, New York 42, Ohio 71 (5), Indiana 4 (1), Illinois 12 (3), Michigan 221 (247), Kansas 1 (2), Kentucky 11 (8), Montana 3, Idaho 3 (9), Wyoming 4 (4), Colorado 6 (15), Nevada 28 (34), Washington 101 (112), Hawaii Territory 15 (8).
Jaundice (including hepatitis and Weil's disease): Maine 2 (1), New York 101 (61), Pennsylvania 101 (14), Ohio 1 Weil's disease, Indiana 1, Illinois 9 (2), Michigan 5 (3), Minnesota 4 (6), Maryland 4 (1), South Carolina 3, Florida 2 (55), Kentucky 13 (38), Tennessee 9 (11), Montana 6, Idaho 3 (2), Nevada 1, Washington 1 (2), Oregon 3 (1), California 233 (11), Hawaii Territory 1 (2), Panama Canal Zone 8 (12).
Lead poisoning: New Hampshire 1.
Leprosy: New York 5 (3), Illinois 1, Texas 1 (3), California 1 (6), Hawaii Territory 12 (8), Panama Canal Zone 1 (2).
Lymphocytic choriomeningitis: Minnesota 1, Tennessee 2 (1), Montana 1.
Lymphogranuloma venereum: Connecticut 5, Florida 37, (38), Kentucky 2 (2), Tennessee 20 (17), Mississippi 42, Louisiana 25 (38), Utah 1 (nonresident), California 26, Alaska 1.
Moniliasis: Minnesota 1.
Mononucleosis: Connecticut 26 (22) Michigan 44 (38), Minnesota 96 (49), Maryland 2 (4), South Carolina 29, Kentucky 9 (4), Tennessee 6 (11), Oklahoma 5 (1), Idaho 1 (13), Arizona 2, Washington 3.
Psittacosis: Michigan 2 (3), California 2 (1).
Puerperal septicemia: New York 3, Pennsylvania 3, Mississippi 2 (1), New Mexico 1.
"Q" Fever: Idaho 6, Colorado 1.
Rabies in animals: Massachusetts 1, Connecticut 3, New York 63 (118), New Jersey 9, Ohio 185 (164), Indiana 251 (287), Illinois 25 (53), Michigan 64 (94), Wisconsin 2 (1), Iowa 82 (13), Kansas 1 (2), Virginia 19 (37), South Carolina 48 (62), Georgia 129 (90), Florida 13 (75), Kentucky 164 (73), Alabama 117 (114), Arkansas 36 (21), Louisiana 12 (26), Oklahoma 41 (41), Texas 290 (300), California 44 (80).
Rat bite fever: Tennessee 3.
Relapsing fever: Texas 4, (16), Panama Canal Zone 1 (2),
Rickettsialpox; New York 35 (60).
Ringworm of the scalp: Connecticut 31, Ohio 12, Indiana 13, Illinois 578, Minnesota 1, Iowa 1, Missouri 11, Kansas 28, Maryland 1, Virginia 4, Georgia 33, Kentucky 221, Oklahoma 15, Montana 1, New Mexico 3, Utah 12, Nevada 10, Oregon 14. Ringworm disease, unspecified: Michigan 513, Idaho 8, Washington 122.
Scabies: Vermont 1, Ohio 51 (14), Michigan 189 (215), North Dakota 3 (5), Kansas 1 (2), Maryland 1 (1), Kentucky 34 (47), Montana 5 (2), Idaho 22 (28), Nevada 10, Alaska 2 (4).
Schistosomiasis: New York 10 (6).
Silicosis: New Hampshire 1, Arkansas 4 (3), Idaho 1, Colorado 2 (1), New Mexico 1 (5), Utah 1.
Yaws: Panama Canal Zone 5 (1).

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 **OCTOBER 21, 1949** NUMBER 42

IN THIS ISSUE

Concept of Multiphasic Screening

Undergraduate Sanitary Engineering Training

U.S. PUBLIC HEALTH SERVICE 1798

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE

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CONTENTS

	Page
The concept of multiphasic screening. A. L. Chapman	1311
Undergraduate sanitary engineering training in the United States. Conrad P. Straub	1315
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended October 1, 1949	1324
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended September 10, 1949	1327
Germany—Typhoid fever	1327
Japan—Notifiable diseases—4 weeks ended August 27, 1949, and accumulated totals for the year to date	1328
Korea—Encephalitis	1328
Norway—Notifiable diseases—June 1949	1328
Switzerland—Notifiable diseases—April–June 1949	1329
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Plague	1329
Smallpox	1329
Deaths during weeks ended September 24 and October 1, 1949	1330

Public Health Reports

Vol. 64 • OCTOBER 21, 1949 • *No. 42*

The Concept of Multiphasic Screening

By A. L. Chapman, M. D.*

As tests for specific diseases have been perfected, methods have been developed for applying these tests on a mass basis. The chest X-ray for tuberculosis and the serological test for syphilis are typical examples of tests suitable for mass application. Recently a quick and economical method of testing small samples of blood for sugar has been worked out thus making it possible to screen out people in whom the index of suspicion for diabetes is high. In nutrition surveys it has been common practice to determine hemoglobin levels which give some indication of the presence or absence of anemia. Vision and hearing testing is routinely done in school examinations, and in some pre-employment examinations. The taking of blood pressures, a relatively simple procedure, is a common practice in hospitals, physicians' offices, and during physical examinations.

Until recently, mass testing of the population, using the tests and procedures mentioned above, has been limited in many areas to one test or to one procedure. There have been separate mass surveys for tuberculosis, for syphilis, and for nutritional deficiencies. It is perfectly logical now for public health administrators to ask the question, "Why not combine as many of these tests as practical into a battery of tests, reduce the over-all cost of administering them, and thereby encourage universal usage?"

The cost of organizing a community and educating the public to the point where individuals will report for a screening examination should be proportionately less than separately organizing the community for each individual test. A single person may be examined for two, or three, or a half dozen diseases, at one time, thus making it unnecessary to have him report to several different centers at various times for single examinations. This consolidation of testing procedures results in a considerable saving in administrative expense.

Another source of economy in a multiphasic screening program is in the cost of personnel. By multiplying the number of examinations on a single specimen of blood, more examinations may be made in

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a given unit of time by one person than when the number of examinations is limited. If one specimen of blood is examined for evidence of syphilis, diabetes, and anemia, blood has to be drawn only once and only a single specimen has to be examined. The same thing is true of the chest X-ray. It takes only a little more time for the radiologist trained in cardiology and tuberculosis to examine the chest film for evidence of heart disease and lung pathology other than tuberculosis than it does to examine the film for evidence of tuberculosis alone.

By setting up a battery of tests certain personnel may serve double duty. Height and weight may be taken by personnel assisting in the other procedures. One technician may test both for vision and hearing defects. In other words, the duties of a large staff may be arranged in such a way that neither time nor effort is lost.

A contemplated advantage of the multiphasic screening program is that it may be adapted to the resources, in terms of personnel and facilities, that are locally available. When resources are extremely limited, the program may have to be an exceedingly simple one. For example, the multiple testing may be limited to blood examination. These blood screening tests will indicate those in the examining line who should be examined by physicians for syphilis, diabetes, and anemia. If X-ray equipment and technicians are available, a chest X-ray for tuberculosis, heart disease and lung pathology may be added. Or a more elaborate series of tests may be set up with little added expense—a series that would include, in addition to the chest X-ray and blood examination, the taking of height, weight, and blood pressure; vision and hearing testing; and even the determination of intraocular pressure in adults to detect the presence of glaucoma. When local health personnel and facilities are meager or lacking, the detection of early cases of chronic illness is nevertheless valuable in order to delineate the problem.

Multiphasic screening examinations are not intended to screen out of the population every case of diabetes, syphilis, tuberculosis, and the other diseases for which tests are made. It is intended, rather, to screen out in the most economical fashion many thousands of cases that would not otherwise be found. Although for practical purposes a screening test may be a diagnostic test, the whole screening procedure is not intended to result in the actual and immediate diagnosis of disease. It is intended to raise the index of suspicion for a disease so that additional tests will be done. The diagnosis is made or rejected by the private physician or by the diagnostic clinic.

The multiphasic screening program can become very useful in the control of the chronic diseases which, at the moment, are receiving emphasis because of the rapid increase in the size of our older popula-

tion. Lacking adequate means of preventing many of the chronic diseases, early diagnosis and early treatment constitute a very effective operation which health departments can undertake in this field. Hypertensives, diagnosed early, can frequently be kept under control by diet therapy. Diabetics can certainly lead a reasonably normal life if found early and placed under adequate medical supervision. The availability of antibiotics for the treatment of syphilis makes the development of the late manifestations of syphilis almost inexcusable. Even cardiacs may be benefited if their cardiac pathology is known and evaluated in time.

The productiveness of a multiphasic screening program can be estimated by a study of prevalence statistics. Based on national estimates, a screening examination of 1,000 apparently well people over the age of 15 for syphilis, diabetes, glaucoma, anemia, tuberculosis, obesity, vision defects, hearing loss, hypertension, and heart disease would result in finding 976 cases of these diseases or pathological physical conditions. Some of the 1,000 people screened probably would have two or more of these diseases or conditions, whereas others would have none. For example, one person might have syphilis and diabetes; another might have a significant refractive error and glaucoma; and still another might be obese and hypertensive.

The distribution of the cases would be as follows· there would be 48 cases of syphilis; 22 cases of diabetes; at least 20 people would have glaucoma (more than 3 percent of the population over 40); 75 would be anemic; 18 or more would have tuberculosis· 200 would be obese; in 266, vision defects would be found; 250 would have a partial hearing loss; hypertension would be present in 38: and at least 39 would have heart disease.

Many of these cases ordinarily may not come to the attention of physicians until definite signs or symptoms have developed. In every community today many people with a chronic disease or a remediable disability, such as faulty vision or a progressive aural disease, are going about their work unaware of the fact that there is anything seriously wrong with them or that they will eventually become hopelessly ill, or permanently disabled. By the time signs and symptoms, which send them to their physician, do develop, much valuable time has been lost and irreversible pathology has been established.

A multiphasic screening program is designed to refer many more persons to physicians for diagnosis and treatment at an earlier stage of their disease than now go of their own volition. These persons will go to physicians not after a chronic illness has rendered them permanently disabled, both economically and physically, but at a time when prompt treatment can assist them to maintain their physical and

economic integrity. This is as important to the physician as it is to the patient.

From the point of view of the taxpayer a multiphasic screening program would be highly desirable. The early detection of persons with a chronic illness makes early treatment possible. This in turn decreases the number of days of hospitalization, and the total amount of medical care required. It therefore lessens the financial burden placed on public agencies that have to provide medical and hospital care for the indigent sick. Another factor of importance is that the prevention of the late complications of chronic illness makes it unnecessary to provide the services of as many able-bodied attendants to care for immobilized patients in hospitals and in the home. The service of these attendants places a heavy financial burden on taxpayers and at the same time makes these attendants unavailable for productive employment.

From the point of view of the health officer, the multiphasic screening program provides an opportunity to increase the quantity of tangible services such as those provided so creditably by the tuberculosis control, venereal disease control, maternal and child health, and other similar programs. Too much that the health department does is hidden from public view. It is not hard for the taxpayer to appreciate the value of a fire department as he watches a fire being extinguished nor the alertness of the police department when a criminal is apprehended. It is far more difficult for the taxpayer to realize that his water supply is protected by the application of complex purification methods; that his milk supply is made safe by pasteurization and by periodic examinations; and that many of the acute infectious diseases have been controlled by the efforts of public health workers and the medical and allied professions.

The multiphasic screening program makes an undeniable appeal to the individual who may be ill, to the physician, to the public health worker, and to the taxpayer. It will foster better teamwork among them all. It will reduce the cost of chronic illness in terms of money and in terms of human misery. There are few communities so devoid of public health, medical and hospital resources, that they cannot support some type of multiphasic screening program. All that is needed is a clear concept of what constitutes a multiphasic screening program and the will to adapt it to local needs.

Undergraduate Sanitary Engineering Training in the United States

By CONRAD P. STRAUB, Ph. D.*

Studies of undergraduate sanitary engineering training have been made in the past by the Public Health Service (*1, 2, 3*). The last of these, made by Arthur P. Miller, reported data pertaining to the 1936–1937 school year, and appeared in 1939.

To obtain information on the changes in sanitary engineering education since 1939, a canvass was made in 1946–1947 of American educational institutions offering degree or option courses in sanitary engineering. Letters of inquiry were directed to 36 schools offering such courses. These institutions were listed in a pamphlet entitled, "Employment Opportunities in Public Health" (*4*). This list and also a list appearing in Engineers' Council for Professional Development (*5*) are included in appendix I.

Thirty-two of the 37 [1] schools originally canvassed submitted catalogs and other pertinent data. Of this number, 22 offered undergraduate sanitary engineering courses and their data were tabulated. Complying with the suggestion that the material be brought up to date and completed, inquiries were again directed to 34 schools offering undergraduate training in sanitary engineering and replies were received from 29. Data had been received in the earlier study from the five institutions that did not reply to this second series of inquiries.

Subject Matter in Course

The undergraduate sanitary engineering curricula of 29 institutions are summarized in table 1 on the basis of percentage of time allotted to the various subjects in the course. The courses of study have been listed more or less according to subject matter and then combined into the six classifications: cultural, pure science, general engineering, sanitary engineering, public health, and miscellaneous. The percentage of undergraduate time allocated to each of these groups, computed on the basis of the credit hours required for a degree, is included in tables 1, 2, 3, and 4. In the preparation of tables 1 and 2, the Public Health Service pattern of grouping subjects was employed (*3*). Since pure science courses, such as bacteriology,

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[1] The curriculum of the Newark College of Engineering was included even though this institution is not listed in reference 4. The writer learned that an option in sanitary engineering was to be offered effective 1946–47, and included the proposed sanitary engineering curriculum.

biology, quantitative, organic and physical chemistry, etc., are akin to the work of the sanitary engineer, they are included with the sanitary engineering group of subjects in table 3.

Differences resulting in the percentages of time allocated to each of the groups are shown in the chart. For comparison, the percentage break-down of the various groups comprising the civil engineering course are indicated in the chart and table 4.

Discussion

Detailed study of tables 1, 2, 3, 4 and the chart indicate the following average conditions:

Sanitary Engineering (a)—pure science subjects beyond general chemistry not included as part of sanitary engineering groups of subjects. The data obtained from the 29 undergraduate institutions show the following percent of time allocations in the groups listed.

Group	*Percent of Time Allocated*			
	Average	*Maximum*	*Minimum*	*Median*
Sanitary engineering	9.4	15.0	3.7	9.3
Public health	0.3	2.1	0	0
Pure science	29.7	40.4	21.7	29.0
General engineering	39.5	54.0	21.1	41.1
Cultural	16.3	27.9	5.6	16.4
Miscellaneous	4.8	14.5	0	5.2

Approximately 10 percent of the time is devoted to a study of sanitary engineering subjects, 30 percent to pure science subjects, 40 percent to general engineering subjects, 16 percent to cultural subjects and 5 percent to miscellaneous subjects. Wide differences are noted in the various curricula in the ranges indicated by the maximum and minimum values. Sanitary engineering subjects ranged from 3.7 to 15.0 percent. The median, or central value, shows remarkable agreement with the mean or average value.

Sanitary Engineering (b)—including all chemistry beyond freshman chemistry, bacteriology, biology, etc. The percent of time allocations on this basis were as follows:

Group	*Percent of Time Allocated*			
	Average	*Maximum*	*Minimum*	*Median*
Sanitary engineering	14.3	32.0	6.7	12.1
Public Health	0.3	2.1	0	0
Pure science	24.8	27.9	21.4	24.6
General engineering	39.5	54.0	21.1	41.1
Cultural	16.3	27.9	5.6	16.4
Miscellaneous	4.8	14.5	0	5.2

With the pure science subjects added to the sanitary engineering curriculum, the percent of time allocated to the sanitary engineering group of subjects is increased to approximately 15 percent; the percent of time devoted to pure science subjects is decreased to 25 percent,

Table 2. *Percentage of time allocated to various groups of subjects—sanitary engineering (a)*

School	Sanitary engineering	Public health	Pure science*	General engineering	Cultural	Miscellaneous
1. Alabama University	7.7	2.1	29.1	35.5	23.1	2.6
2. California University	12.6	-	34.8	39.3	7.4	5.9
6. Georgia Institute of Technology	10.3	-	34.7	33.1	14.5	7.4
8. Illinois University	9.0	-	35.4	44.4	5.6	5.6
9. Iowa State University	11.0	-	26.2	48.3	11.7	2.8
11. Kansas University	8.5	1.4	31.2	44.0	14.9	-
12. Kentucky University	6.9	1.7	40.3	30.7	13.9	6.5
13. Lehigh University	6.2	-	32.9	34.2	21.2	5.5
14. Louisiana State University	15.0	-	40.1	21.1	17.0	6.8
15. Maine University	4.5	-	30.8	41.6	18.6	4.5
16. Manhattan College	9.5	-	24.4	44.0	22.0	-
17. Massachusetts Institute of Technology	11.8	-	24.1	45.1	13.8	5.2
18. Michigan State College	15.0	-	29.0	32.2	16.8	7.0
19. Michigan University	11.0	-	30.6	42.4	13.1	2.9
20. Minnesota University	8.2	1.8	24.7	41.7	22.9	0.7
21. Newark College of Engineering	6.4	-	27.9	37.8	27.9	-
22. New York University	9.2	-	22.9	41.1	21.6	5.2
23. North Carolina State College	9.6	-	26.4	33.9	22.6	7.5
26. Oregon State College	5.8	-	21.7	43.0	15.0	14.5
27. Pennsylvania State College	13.8	-	31.7	29.7	17.9	6.9
28. Purdue University	8.3	-	25.5	39.0	18.7	8.5
29. Rutgers University	12.9	-	33.7	35.6	12.9	4.9
30. Santa Clara University	9.3	-	27.9	42.1	16.4	4.3
32. Texas A. & M. College	13.3	-	26.6	39.3	18.4	2.5
33. Texas University	5.5	-	40.1	33.6	20.5	-
34. Washington State College	3.7	-	27.3	49.0	13.3	6.7
35. Washington University	7.0	1.5	23.5	44.5	14.5	9.0
36. West Virginia University	9.7	-	29.2	45.5	9.1	6.5
37. Wisconsin University	11.2	-	28.3	54.0	6.6	-
Average	9.4	0.3	29.7	39.5	16.3	4.8

*All pure science subjects included here. See table 1 for pure science subjects.

Table 3. *Percentage of time allocated to various groups of subjects—sanitary engineering (b)*

School	Sanitary engineering*	Public health	Pure science	General engineering	Cultural	Miscellaneous
1. Alabama University	10.3	2.1	26.5	35.5	23.1	2.6
2. California University	20.0	-	27.5	39.3	7.4	5.9
6. Georgia Institute of Technology	18.5	-	26.4	33.1	14.5	7.4
8. Illinois University	18.1	-	26.4	44.4	5.6	5.6
9. Iowa State University	11.0	-	26.2	48.3	11.7	2.8
11. Kansas University	12.1	1.4	27.6	44.0	14.9	-
12. Kentucky University	22.5	1.7	24.7	30.7	13.9	6.5
13. Lehigh University	15.1		21.0	34.2	21.2	5.5
14. Louisiana State University	32.0	-	23.1	21.1	17.0	6.8
15. Maine University	10.9		21.5	41.6	18.6	4.5
16. Manhattan College	11.3	-	22.6	44.0	22.0	-
17. Massachusetts Institute of Technology	11.8		21.1	45.1	13.8	5.2
18. Michigan State College	21.5		22.4	32.3	16.8	7.0
19. Michigan University	13.9		27.8	42.4	13.1	2.9
20. Minnesota University	11.4	1.8	21.4	41.7	22.9	0.7
21. Newark College of Engineering	8.7		25.6	37.8	27.9	
22. New York University	9.2	-	22.9	41.1	21.6	5.2
23. North Carolina State College	12.1	-	23.8	33.9	22.6	7.5
26. Oregon State College	7.2	-	20.3	43.0	15.0	11.5
27. Pennsylvania State College	18.6		28.9	29.7	17.9	6.9
28. Purdue University	10.8	-	23.0	39.0	18.7	8.5
29. Rutgers University	21.5	-	22.1	35.6	12.9	4.9
30. Santa Clara University	9.3	-	27.9	42.1	16.4	4.3
32. Texas A. & M. College	15.2	-	21.6	39.3	18.4	2.5
33. Texas University	20.5		25.4	33.6	20.5	-
34. Washington State College	6.7	-	24.3	40.0	13.3	6.7
35. Washington University	7.0	1.5	23.5	44.5	14.5	9.0
36. West Virginia University	11.7	-	27.3	45.5	9.1	6.5
37. Wisconsin University	13.8	-	25.7	54.0	6.6	-
Average	14.3	0.3	24.8	39.5	16.3	4.8

*Sanitary engineering includes pure science subjects such as bacteriology, biology, all chemistry beyond freshmen chemistry, etc.

Table 4. *Percentage of time allocated to various groups of subjects—civil engineering curriculum*

School	Sanitary engineering	Pure science	General engineering	Cultural	Miscellaneous
1. Alabama University [1]	2.2	25.9	44.8	24.5	2.6
2. California University [1]	2.9	27.2	60.3	3.7	5.9
3. Case Institute of Technology [2]	5.2	25.8	45.4	19.0	4.6
4. Colorado State College	4.2	24.1	42.1	24.1	5.6
5. Cornell University [2]	4.9	20.5	51.9	22.7	----------
8. Illinois University	4.9	26.6	55.2	7.7	5.6
9. Iowa State University	4.9	28.9	51.4	12.0	2.8
11. Kansas University	3.6	27.8	55.7	12.9	----------
12. Kentucky University	4.3	28.3	47.6	13.3	6.4
13. Lehigh University	4.1	24.0	45.9	20.6	5.5
14. Louisiana State University	4.1	23.8	50.2	15.0	6.8
17. Massachusetts Institute of Technology	2.6	25.8	52.7	13.8	5.2
18. Michigan State College [2]	3.3	22.0	51.0	16.8	7.0
20. Minnesota University	2.2	25.1	47.6	24.4	0.7
21. Newark College of Engineering	3.6	28.4	41.5	26.6	----------
22. New York University	5.3	23.2	44.4	21.8	5.3
23. North Carolina State College [2]	3.3	25.1	40.7	23.4	7.4
25. Oklahoma A. & M. College [2]	6.1	28.4	46.7	13.5	5.4
26. Oregon State College [3]	1.4	20.3	49.3	14.5	14.5
28. Purdue University	2.7	23.0	49.0	16.8	8.5
30. Santa Clara University [3]	2.9	27.9	48.5	16.4	4.3
32. Texas A. & M. College	3.8	24.7	52.6	16.4	2.5
34. Washington State College	3.7	27.3	49.0	13.3	6.7
36. West Virginia University	4.5	29.2	50.6	9.1	6.5
37. Wisconsin University	3.3	25.7	64.6	6.6	----------
Average	3.8	25.6	49.5	16.4	4.8

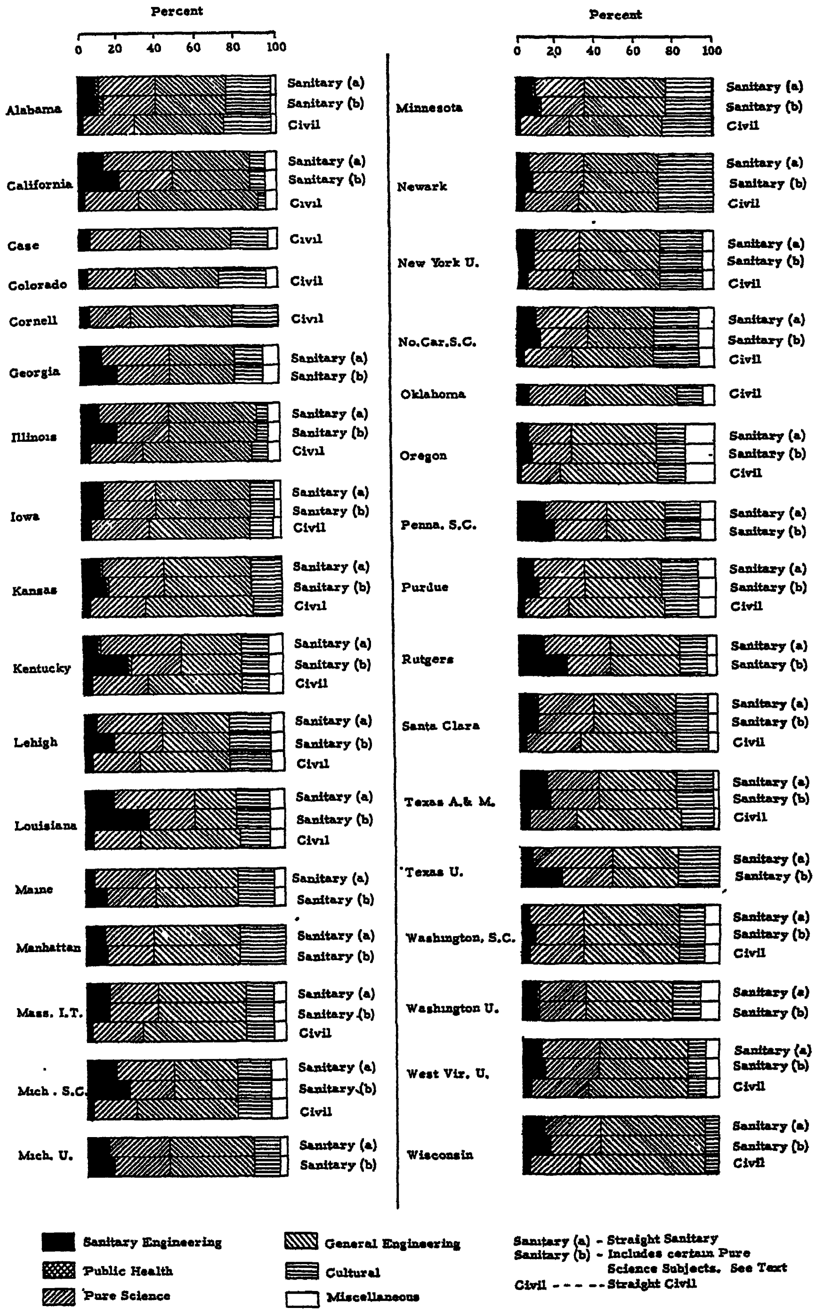
[1] Construction option. [2] 1946-47 data. [3] Structural option.

and the others remain the same. The maximum and minimum values in the pure science category show a relatively small range indicating that, in general, the time allotted to this field of subjects is about equal at all institutions (21 to 28 percent). As before, wide differences are noted in the other categories, and the median and mean, or average values, are approximately equal.

Civil engineering. The percent of time allocated to each of the groups of subjects was as follows:

Group	*Percent of Time Allocated* *Average*	*Maximum*	*Minimum*	*Median*
Sanitary engineering	3.8	6.1	1.4	3.7
Pure science	25.6	29.2	20.3	25.8
General engineering	49.5	64.6	40.7	49.0
Cultural	16.4	26.6	3.7	16.4
Miscellaneous	4.8	14.5	0	5.4

Approximately 4 percent of the time allotted in civil engineering curricula is devoted to a study of sanitary engineering subjects. These include primarily water supply and sewerage and sanitary engineering design. Of the remaining time, about 25 percent is assigned to pure science subjects, 50 percent to general engineering subjects, 16 percent to cultural subjects, and 5 percent to miscellaneous subjects. The range in maximum and minimum values is rather large in some instances as indicated by the tabulated values.



Bar diagram shows percent of time allocated to the groups of subjects: sanitary engineering, public health, pure science, general engineering, cultural, and miscellaneous. Comparisons are made with civil engineering courses.

A study of the 29 undergraduate sanitary engineering curricula listed indicates that courses in bacteriology are required at 20 institutions, in biology at 8, some form of sanitary chemistry at 10, sanitary engineering laboratory at 11, industrial wastes at 1, stream pollution at 1, and public health engineering or sanitary engineering at 13 institutions. These data indicate that there appears to be wide diversity of opinion as to what courses should be offered in sanitary engineering.

It is interesting to note the changes that have occurred in the last few years in the percentage of time allocated to the various groups of subjects when compared with similar data in the earlier reports (*1*, *2*, *3*). There appears to be a slight decrease in the percent of time devoted to sanitary engineering during the past 20 years, a decrease in public health and general engineering, and an increase in pure science and cultural subjects. The time allotted to cultural subjects has increased substantially since 1936–37. This trend is in line with the recommendation made by the American Society for Engineering Education Committee (*6*), "Introduction of a carefully planned and integrated stem of humanistic-social courses which would take about 20 percent of the students' time . . ."

Group	*Average Percentages of Time Allotted to Subject Groups*			
		1946–47	*1936–37**	*1929**
Sanitary engineering	9. 4	10. 3	10. 3	12. 1
Public health	0. 3	0. 3	1. 2	0. 7
Pure science	29. 7	30. 4	28. 3	26. 9
General engineering	39. 5	38. 7	44. 5	43. 5
Cultural	16. 3	16. 1	9. 5	14. 2
Miscellaneous	4. 8	4. 3	6. 1	2. 7

*Data taken from reference 3.

Included in appendix II for purposes of comparison is a sanitary engineering curriculum of study proposed by Alexander Szniolis (*7*) for use in Polish technological institutions.

Degrees Offered

A variety of degrees are offered to under graduate students completing the courses in sanitary engineering.[2] A total of fifteen different degrees is offered by the 29 institutions listed in table 1.

[2] The author has compiled information on the undergraduate courses offered in sanitary engineering at the several engineering colleges in the United States. A compilation is available without charge on request to the Public Health Service, Bureau of State Services, Washington 25, D. C.

Summary

Information on undergraduate sanitary engineering curricula at 29 American educational institutions is presented, and time allotted to groups of subjects is compared with that allocated to similar groups of subjects included in civil engineering curricula.

ACKNOWLEDGMENT

The author is very grateful to the college and university authorities and to the many professors who contributed their time to reply to the various inquiries.

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(*5*) Engineers' Council for Professional Development: Fourteenth annual report for the year ending September 30, 1946. New York, The Council, 1947.
(*6*) Wessman, Harold E.: Pendulum swings toward broadening of curricula in engineering education. Civil Engineering **19**: 242 (1949).
(*7*) Szniolis, Alexander: W sprawie szkolenia inzynierow sanitarynch w Polsce (On the problem of training sanitary engineers in Poland). Gaz, Woda i Technika Sanitarna **22**: 130 (1948).

APPENDIX I

The following, taken from "Employment Opportunities in Public Health" (*4*), are institutions offering courses in sanitary engineering or sanitary engineering option of civil engineering, which have requested and have been accredited by the Engineers' Council for Professional Development:

University of California
Case School of Applied Science
Colorado State College
Cornell University
Harvard University
University of Illinois
State University of Iowa
University of Kansas
University of Kentucky
Lehigh University
Louisiana State University
University of Maine
Manhattan College
Massachusetts Institute of Technology
Michigan State College
University of Michigan
New York University
North Carolina State College
Oklahoma Agricultural and Mechanical College
Pennsylvania State College
Purdue University
Rutgers University
Santa Clara University
University of Texas
State College of Washington
West Virginia University
University of Wisconsin

Partial list of other institutions offering instruction in sanitary engineering and public health engineering, in undergraduate option or as a graduate major, or both:

University of Alabama
Georgia Institute of Technology
Johns Hopkins University
University of Minnesota
University of North Carolina
Oregon State University
Stanford University
Texas Agricultural and Mechanical College
Washington University

A somewhat similar tabulation appeared in "Engineers' Council for Professional Development" (*5*).

Accredited Sanitary Engineering Curricula:

Harvard University [1]
Massachusetts Institute of Technology
Pennsylvania State College
Rutgers University

Options as part of other accredited curricula noted:

University of California
Case School of Applied Science
Colorado State College
Cornell University
University of Illinois
State University of Iowa
University of Kansas
University of Kentucky
Lehigh University
Louisiana State University
University of Maine
Manhattan College
Michigan State College
University of Michigan
New York University [2]
North Carolina State College
Oklahoma Agricultural and Mechanical College
Purdue University
University of Santa Clara
University of Texas
State College of Washington
West Virginia University
University of Wisconsin

[1] Accrediting applies only to curriculum as submitted to ECPD and upon completion of which a certificate is issued by Harvard University certifying that the student has pursued such curriculum.

[2] Accrediting applies to day and night curricula.

APPENDIX II

Curriculum in sanitary engineering proposed by Szniolis (7) for use in Polish technical schools.

Subject	*Hours per week*			
	1st semester		2d semester	
1st year:	*lecture*	*lab.*	*lecture*	*lab.*
Elements of higher mathematics	4	2	4	2
Physics	4	3	3	--------
Machine components	--------	--------	2	--------
Descriptive geometry	3	3	--------	--------
General chemistry	5	6	5	--------
General and fluid mechanics	--------	--------	4	2
Materials of construction	2	--------	2	1
General and engineering geology	--------	--------	3	1
Drafting (engineering drawing)	--------	2	--------	2
General hygiene	3	--------	3	--------
English language	2	--------	2	--------
Total	23	16	28	8

Subject	*Hours per week*			
	1st semester		2d semester	
	lecture	*lab.*	*lecture*	*lab.*
2d year:				
Statistical methods for engineers	2	2	----	----
Physical chemistry	----	----	3	----
Analytical chemistry	1	15	1	16
General machinery	2	----	----	2
Strength of materials	2	1	----	----
Structures I	----	----	4	4
Statics	----	----	4	6
Applied hydraulics	2	1	----	----
Regional geology	----	----	2	1
General biology	3	----	3	----
Economics	3	----	----	----
Total	15	19	17	29
3d year:				
General sanitation	4	----	----	----
Sanitary analysis	2	4	2	4
Microbiology and parasitology	2	4	2	4
Hydrogeology and well drilling	----	----	2	2
Water and sewage technology	----	----	4	----
Technology of industrial processes	----	----	4	----
Electrical engineering	1	2	2	2
Soil science and melioration in relation to sanitary engineering	2	2	----	----
Meteorology and climatology	----	----	----	4
Water supply and sewerage	4	----	----	4
Hydraulic construction	2	----	----	----
Structures (earthworks, foundations, reinforced concrete, and steel construction)	4	3	----	----
Rural construction	----	----	2	----
Total	21	15	20	16
4th year:				
Water and sewage technology	2	4	2	2
Technology of industrial processes	4	----	----	----
Industrial hygiene and safety	2	4	2	2
Sanitation of food industries	2	----	----	----
Control of disease vectors	3	1	----	----
Air conditioning	4	2	----	----
Industrial waste disposal	----	----	3	----
Limnology and stream protection	2	1	----	----
Community planning	1	1	----	----
Construction of sanitary facilities	2	2	----	----
Organization and execution of projects	----	----	2	----
Construction laws and specifications	----	----	2	----
Public health organization and regulations	2	----	----	----
Evaluation and design of sanitary facilities	----	----	2	4
Thesis	----	----	----	18
Total	24	15	13	26

For convenience in comparing these data with those given in the body of the report, percentages of time allocated to the various groups of subjects have been computed and are tabulated below.

Percent of Time Allotted to Subject Groups

	Sanitary engineering			*Sanitary engineering*	
	(a)	*(b)*		*(a)*	*(b)*
Sanitary engineering	28.3	39.7	General engineering	36.5	36.5
Public health	2.6	2.6	Cultural	3.0	3.0
Pure science	28.8	17.4	Miscellaneous	0.9	0.9

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 1, 1949

A total of 1,855 cases of poliomyelitis was reported during the current week, as compared with 2,192 last week—a decrease of 337 cases, or approximately 15 percent (decrease last week 16.5 percent, same week last year 4.9 percent). The median figure of the corresponding weeks of the past 5 years is 976. Currently, decreases were reported in all of the 9 geographic divisions. Increases totaling 75 cases (none of more than 13 cases) were reported in 13 States. The 23 States reporting more than 20 cases each are as follows (last week's figures in parentheses): *Increases*—Connecticut 40 (32), Indiana 36 (35), Iowa 56 (44), South Dakota 25 (18), Colorado 36 (33); *decreases*—Massachusetts 82 (143), New York 287 (288), New Jersey 65 (91), Pennsylvania 47 (59), Ohio 105 (125), Illinois 113 (135), Michigan 134 (170), Wisconsin 68 (87), Minnesota 89 (121), Missouri 27 (54), Nebraska 41 (51), Kansas 21 (32), Kentucky 33 (47), Arkansas 25 (26), Oklahoma 40 (43), Texas 67 (90), Washington 36 (44), California 117 (122).

For the year to date (39 weeks) a total of 33,144 cases has been reported, as compared with 19,174 for the same period last year and a 5-year median of 14,546. For the comparable periods of the 6 years 1943–48 (combined), approximately 72 percent of the combined totals for those years was reported.

During the week, 1 case of anthrax was reported in New York. Of 44 cases of infectious encephalitis, in 16 States, South Dakota reported 18, Colorado 5, and Oklahoma 4. Ten cases of Rocky Mountain spotted fever were reported in 8 States.

A total of 8,274 deaths was recorded during the week in 93 large cities in the United States, as compared with 8,444 last week, 8,326 and 8,413, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year 1946–48 median of 8,326. For the year to date the total is 349,332, as compared with 351,511 for the same period last year. Infant deaths totaled 660, last week 703, same week last year 653, 3-year median 667. The cumulative figure is 25,145, same period last year 25,601.

Telegraphic case reports from State health officers for the week ended Oct. 1, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	----	----	----	21	----	11	17	----	2	----	----	3	2	----
New Hampshire	----	----	----	----	----	----	16	----	----	----	----	----	----	----
Vermont	----	----	----	6	----	1	15	----	----	----	----	----	3	----
Massachusetts	6	1	----	12	----	----	82	----	20	----	----	----	79	----
Rhode Island	----	----	----	----	----	----	11	----	3	----	----	----	2	----
Connecticut	----	1	----	7	2	29	40	----	6	----	----	----	28	----
MIDDLE ATLANTIC														
New York	4	----	[e]	50	5	113	287	1	[d] 26	----	----	8	150	12
New Jersey	----	----	1	35	----	32	65	1	12	----	----	1	127	1
Pennsylvania	2	1	[e]	22	6	50	47	----	21	----	----	9	168	----
EAST NORTH CENTRAL														
Ohio	2	----	2	10	4	48	105	----	63	----	----	5	76	7
Indiana	10	----	2	1	1	----	36	----	14	----	----	1	7	19
Illinois	1	1	2	10	5	97	113	1	18	----	1	2	96	1
Michigan [a]	3	----	1	41	----	16	[1] 134	----	52	----	----	----	158	5
Wisconsin	1	----	3	38	2	6	68	----	11	----	----	----	59	----
WEST NORTH CENTRAL														
Minnesota	4	2	----	12	3	28	89	----	17	----	----	2	2	----
Iowa	----	----	----	3	----	----	56	----	3	----	----	----	2	1
Missouri	7	----	1	3	----	11	27	----	6	----	1	3	2	----
North Dakota	----	2	12	4	1	----	5	----	----	----	----	----	----	----
South Dakota	1	18	----	1	1	----	25	----	4	----	----	----	1	----
Nebraska	----	1	11	5	1	5	41	----	20	----	----	----	3	----
Kansas	2	----	2	3	----	15	21	----	6	----	----	1	18	----
SOUTH ATLANTIC														
Delaware	----	----	----	1	----	----	----	----	2	----	----	----	9	----
Maryland [a]	6	1	5	7	1	22	[1] 13	----	[d] 12	----	1	1	43	----
District of Columbia	----	----	----	----	----	7	8	----	3	----	----	----	3	----
Virginia	7	----	77	5	----	23	13	2	7	----	----	7	16	----
West Virginia	9	----	10	10	1	2	7	----	15	----	----	1	10	----
North Carolina	19	----	----	----	1	----	14	2	50	----	----	[f] 1	14	----
South Carolina	10	----	7	2	----	12	5	----	3	----	----	2	1	6
Georgia	11	3	6	4	----	73	13	----	19	----	----	8	7	6
Florida	4	----	1	9	----	20	8	----	1	----	----	2	7	----

Telegraphic case reports from State health officers for the week ended Oct. 1, 1949—Continued

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
EAST SOUTH CENTRAL														
Kentucky	15				2	14	33		46			1	20	9
Tennessee	10		10	14	2	26	13		36			5	15	
Alabama	14		4	1	1	25	8	1	8				5	6
Mississippi [a]	12		3	6		8	10		13			4	1	
WEST SOUTH CENTRAL														
Arkansas	4		29	1		12	25		5		6	6	9	1
Louisiana	0			3		7	7		4			3		
Oklahoma	3	4	19	5	3	12	40	1	6		1	2	4	
Texas	18	1	716	34	4	158	67		10			4	92	14
MOUNTAIN														
Montana	1		10	22		5	12		2				3	
Idaho				1		6	10		[d] 10				6	
Wyoming					1		7		2		2	1	1	
Colorado	2	5	23	8	2	12	36	1	5			5	5	1
New Mexico	1	1	1	3		11	7						9	
Arizona		1	52	13	1	10	9		2				5	
Utah [a]				14			14				1	2	12	
Nevada														
PACIFIC														
Washington				14		1	36		9				21	
Oregon			6	15		21	17		5				16	
California	2	1	3	33	4	20	117		[d] 22			12	98	1
Total	197	44	1,019	509	54	969	1,855	10	601		13	102	1,421	
Median, 1944–48	313	28	1,111	612	64		976	10	912	1	14	114	1,728	
Year to date 39 weeks	5,267	577	81,694	590,404	2,818	60,700	[1] 33,144	531	60,690	43	918	[2] 2,912	46,602	
Median, 1944–48	8,429	483	195,844	554,446	4,799		14,546	497	90,904	283	717	3,225	75,875	
	(27th)		(30th)	(35th)	(37th)		(11th)		(32nd)	(35th)		(11th)	(39th)	
Seasonal low week ends	July 9		July 30	Sept. 3	Sept. 17		Mar. 19		Aug. 13	Sept. 3		Mar. 19	Oct. 2	
Since seasonal low week	1,499		5,827	1,886	102		[1] 32,228		2,430	2		[2] 2,452	56,635	
Median, 1944–45 to 1948–49 [b]	2,713		5,647	2,178	133		14,283		4,609	10		2,750	102,319	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for whooping cough, the corresponding periods are 1943–44 to 1947–48.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately as follows: Virginia 1, Georgia 2, Florida 1, Tennessee 2, Texas 1, Wyoming 1, California 9. Cases reported as Salmonella infection, not included in the table were as follows: Massachusetts 3, New York 4.
[1] Poliomyelitis: Delayed report, Maryland, August onset 2 cases; deductions, Michigan, weeks ended August 20, and September 10, 1 case each.
[2] Typhoid fever: Deduction, North Carolina, week ended July 30, 1 case.
Anthrax: New York 1 case.
Alaska: Septic sore throat 16.
Hawaii Territory: Measles 5, lobar pneumonia 1.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended September 10, 1949.—During the week ended September 10, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			9		23	32	6	10	18	11	109
Diphtheria			1		6					1	8
Dysentery:											
Amebic								4			4
Bacillary					1						1
Encephalitis, infectious							2		1		3
German measles			1		1	5			5	1	13
Influenza			25			2	1				28
Measles			12		28	33	14	89	14	46	236
Meningitis, meningococcal				1	2		1				4
Mumps			10		3	36	3	21	5	31	109
Poliomyelitis	2		8	3	34	81	13	16	10	15	182
Scarlet fever	2		1		23	10	3	6	10		55
Tuberculosis (all forms)			2	6	75	22	14	14		52	185
Typhoid and paratyphoid fever					7	2	1			5	15
Undulant fever					1	3	1				5
Venereal diseases:											
Gonorrhea	6	6	14	14	100	59	25	6	34		264
Syphilis	3	2	5	16	38	22	3	6	4		99
Whooping cough				1	73	61	6	5	1	4	151

GERMANY

Typhoid fever.—Information received through the American Consulate at Bremen, Germany, dated September 12, 1949, states that 169 cases of typhoid fever have been reported in the town of Dueren in the Rhineland. On August 31, 1949, approximately 230 cases were reported in the town of Krefeld, which is located about 13 miles from the city of Dusseldorf. Local doctors in the town of Waldbroel, near Gummersbach, state that there is an epidemic of typhoid fever in that town also.

JAPAN

Notifiable diseases—4 weeks ended August 27, 1949, and accumulated totals for the year to date.—For the 4 weeks ended August 27, 1949, and for the year to date, certain notifiable diseases were reported in Japan as follows:

Disease	4 weeks ended Aug. 27, 1949		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	543	43	9,859	996
Dysentery, unspecified	7,039	1,898	14,565	4,019
Encephalitis, Japanese "B"	75	20	91	29
Gonorrhea	13,101		123,507	
Influenza	47		1,824	
Malaria	507	5	2,974	40
Measles	6,851		154,401	
Meningitis, epidemic	102	31	1,010	289
Paratyphoid fever	302	10	1,542	63
Pneumonia	4,420		104,850	
Scarlet fever	208	7	3,202	49
Smallpox			120	12
Syphilis	11,864		132,999	
Tuberculosis	37,270		313,846	
Typhoid fever	865	115	4,173	507
Typhus fever			91	6
Whooping cough	17,720		85,832	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

KOREA

Encephalitis.—According to information dated September 22, 1949, incidence of encephalitis in Seoul, Korea, has dropped to a small figure, but is still high in surrounding Kyunggi Province. During the period September 19–21, 48 cases with 1 death were reported in Seoul, 130 cases, 65 deaths in Kyunggi Province. Definite reports from other areas were not available.

NORWAY

Notifiable diseases—June 1949.—During the Month of June 1949, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	12	Measles	2,221
Diphtheria	27	Mumps	436
Dysentery, unspecified	11	Paratyphoid fever	7
Encephalitis, epidemic	1	Pneumonia (all forms)	2,168
Erysipelas	335	Poliomyelitis	3
Gastroenteritis	3,722	Rheumatic fever	112
Gonorrhea	294	Scabies	1,160
Hepatitis, epidemic	124	Scarlet fever	481
Impetigo contagiosa	1,913	Syphilis	69
Influenza	2,079	Tuberculosis (all forms)	409
Laryngitis	9,351	Whooping cough	5,015
Malaria	1		

SWITZERLAND

Notifiable diseases—April—June 1949.—During the months of April, May, and June 1949, cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	April	May	June
Cerebrospinal meningitis	4	7	10
Chickenpox	193	255	363
Diphtheria	53	106	77
Dysentery			9
Encephalitis, lethargic	1		
Hepatitis, epidemic	19	20	33
Influenza	323	50	13
Malaria			2
Measles	891	939	1,216
Mumps	256	198	327
Paratyphoid fever	4	11	3
Poliomyelitis	5	12	34
Scarlet fever	588	491	837
Tuberculosis	341	315	877
Typhoid fever	2	5	3
Undulant fever	14	24	18
Whooping cough	474	634	695

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

China—Manchuria.—According to information received from Peiping, dated September 15, 1949, a telegram to Tientsin Municipal Health Bureau from North China People's Government Health Department, dated September 10, stated that plague had appeared in Liao Si, Ssu Ping Kai, Chang Tu, and other places in Manchuria. No figures were given in the report.

Java—Jogjakarta Residency.—During the period August 20–September 10, 1949, 75 fatal cases of plague were reported in Jogjakarta Residency, Java. During the week ended September 17, 4 fatal cases were reported in the city of Jogjakarta.

Madagascar.—During the period September 1–10, 1949, 15 fatal cases of plague were reported in Madagascar.

Union of South Africa—Cape Province.—During the week ended September 17, 1949, plague was reported in Hay District, Cape Province, Union of South Africa, as follows: 2 fatal cases (pneumonic) at Grove Farm, 3 suspected cases at Sterkfontein Farm.

Smallpox

Netherlands Indies—Java.—Smallpox has been reported in cities in Java as follows: Batavia, week ended September 10, 1949, 197

cases, 38 deaths, week ended September 17, 189 cases, 32 deaths; Bandoeng, week ended August 20, 84 cases, 19 deaths; Cheribon, week ended August 20, 91 cases, 33 deaths; Semarang, week ended August 27, 161 cases, 25 deaths, week ended September 3, 95 cases, 18 deaths, week ended September 10, 49 cases, 7 deaths, week ended September 17, 30 cases, 1 death.

The following information as to press reports dealing with the smallpox epidemic in Batavia and other parts of Java has been received from Batavia: Under date of August 12, 1949, it is stated that according to an article appearing in a local newspaper, 5,358 cases of smallpox (1,790 of which were said to have been fatal) had been reported in Batavia and neighboring areas since January, and an additional 1,469 cases, with 149 deaths, had been reported in the surrounding countryside; further information, dated September 6, quotes a news article which appeared on August 30, in a local newspaper as stating that the Pasundan Health Department had reported 10,000 cases registered in Pasundan. The report said that on August 10, 9,486 cases had been registered, including 365 cases in the city of Bandoeng.

Nigeria.—During the period June 19–July 30, 1949, 761 cases of smallpox with 126 deaths were reported in Nigeria.

DEATHS DURING WEEKS ENDED SEPT. 24 AND OCT. 1, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Sept. 24, 1949	Corresponding week, 1948	Week ended Oct. 1, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:[1]				
Total deaths	8,640	8,079	8,274	8,326
Median for 3 prior years	8,201		8,326	
Total deaths, first 38 and 39 weeks of year	349,323	351,463	349,332	351,511
Deaths under 1 year of age	709	651	660	653
Median for 3 prior years	651		667	
Deaths under 1 year of age, first 38 and 39 weeks of year	24,857	25,448	25,145	25,601
Data from industrial insurance companies:				
Policies in force	70,247,170	70,885,689	70,125,164	70,860,825
Number of death claims	11,448	12,120	11,827	11,156
Death claims for 1,000 policies in force, annual rate	8.5	8.9	8.8	8.2
Death claims per 1,000 policies, first 38 and 39 weeks of year, annual rate	9.2	9.4	9.2	9.4

[1] 93 cities for week ended Oct. 1, 1949.

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 **OCTOBER 28, 1949** NUMBER 43

IN THIS ISSUE

Housing Act of 1949

Physiology of Housing

Rickettsia from *Amblyomma maculatum*

Industrial Sickness Absenteeism

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

CONTENTS

	Page
The housing act of 1949 and health department programs. Ralph J. Johnson	1331
Physiological aspects of better housing. Heinz Specht and Paul A. Neal	1337
Serological characteristics of a pathogenic rickettsia occurring in *Amblyomma maculatum*. D. B. Lackman, R. R. Parker and R. K. Gerloff	1342
Industrial sickness absenteeism. Males and females, 1948, and males, first and second quarters, 1949. W. M. Gafafer	1350
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended October 8, 1949	1353
Territories and possessions:	
Puerto Rico—Notifiable diseases—5 weeks ended October 1, 1949	1356
Deaths during week ended October 8, 1949	1356
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended September 17, 1949	1357
World distribution of cholera, plague, smallpox, typhus fever, and yellow fever—	
Cholera	1357
Plague	1358
Smallpox	1359
Typhus fever	1361
Yellow fever	1362

Public Health Reports

Vol. 64 • OCTOBER 28, 1949 • *No. 43*

The Housing Act of 1949 and Health Department Programs

By RALPH J. JOHNSON, M. S. *

The Housing Act of 1949, approved by the President July 15, has important implications for the public health profession in the provisions for slum clearance and urban redevelopment, farm housing, low-rent housing, and research (*1*). As the President has said, "This far-reaching measure is of great significance to the welfare of the American people."

The declaration of national housing policy in the act reads, "The Congress hereby declares that the general welfare and security of the Nation and the health and living standards of its people require housing production and related community development sufficient to remedy the serious housing shortage, the elimination of substandard and other inadequate housing through the clearance of slums and blighted areas, and the realization as soon as feasible of the goal of a decent home and a suitable living environment for every American family, thus contributing to the development and redevelopment of communities and to the advancement of the growth, wealth, and security of the Nation." In the attainment of these objectives, the act states primary reliance shall be placed on and maximum assistance given to private enterprise, but Federal assistance is to be extended to meet those needs which cannot be met by private enterprise. This requires the cooperative effort of local public bodies, private enterprise, and the Federal Government.

There are six titles in the act. Title I—Slum Clearance and Community Development and Redevelopment—authorizes $1 billion in loans and $500 million for grants. The Administrator of the Housing and Home Finance Agency is authorized to make loans to local public agencies [1] for the undertaking of projects for the assembly, clearance, preparation, sale, and lease of land for redevelopment. This includes the advancement of loan funds to local public agencies for plans,

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[1] Although the law is not specific on this point, it is likely that loans will be made primarily to local housing authorities and urban redevelopment agencies.

surveys, and preparation of projects which may be assisted under Title I, provided that such advances of funds shall be repaid, including interest, out of monies which become available for the projects. The grants may be used to absorb up to two-thirds of the net cost of the slum clearance operation.

Slum clearance and community development and redevelopment involve the acquisition of blighted and slum areas by a governmental body for the purpose of putting the acquired land to a more satisfactory use in the light of local conditions and requirements. This does not mean that the acquired land will necessarily be used for housing purposes. If community planning requirements so demand, the area may be converted to commercial or industrial uses, parks, schools, recreation, or other public or private uses. Local public agencies must provide grants-in-aid equal to at least one-third of the aggregate net project cost.

In order to qualify for loans or capital grants, the local public agencies must, among other requirements, have an approved general plan. One of the few methods for obtaining objective information for the development of such a plan is the Appraisal Method for Measuring the Quality of Housing developed by the Committee on the Hygiene of Housing of the American Public Health Association and now used by many local health departments in their operating program (*2*). The National Health Assembly official report states that: "The public health department has a primary responsibility in community planning because of its duty to promote and protect the health of the people. Other governmental agencies are generally charged with the legal responsibility for planning. It is, therefore, essential that public health departments be adequately represented at the policy-making level of the community planning agencies" (*3*). Accordingly, health departments should be prepared to participate with housing authorities, redevelopment authorities, planning departments, zoning organizations, building, police, fire, welfare, and public works departments in the development of these plans.

As a part of the huge task, it will be necessary under the act to make provision for decent, safe, and sanitary dwellings for families required to move, either temporarily or permanently, from the redeveloped area. It is too early to state what redevelopment authorities may expect of health departments in this respect. Traditionally, of course, health departments have been responsible for controlling the quality of existing housing. If local health agencies are conducting programs to control and improve the quality of housing, integration with redevelopment requirements will not be difficult and should serve to make the health department programs more effective.

Health departments can make significant contributions to urban

redevelopment programs by establishing standards of occupancy, quality of housing, and environmental conditions. Likewise, health departments may assume a more active role in the preservation of existing good conditions and prevention of the spread of blighted areas and slums. In addition, the health department may contribute by continuing to be active in the rehabilitation and modernization of the less severely blighted areas, including the conservation of structures that are fundamentally sound. The active cooperation of health and redevelopment officials can be mutually beneficial.

Title II—Amendments to the National Housing Act—provides for temporary extension of the Federal Housing Administration's loan and mortgage insurance operations under Titles I and VI of the National Housing Act relating to small loans for repairs, modernization, or alteration, and new construction of rental housing. The act also increases by $500 million the amount of Federal Housing Administration mortgage insurance which may be outstanding under Title II of the National Housing Act to finance sale and rental housing. These provisions will stimulate housing activity related to the Federal Housing Administration program. Consequently, the workload of health departments will increase in direct relationship to their present responsibilities under existing Federal Housing Administration programs.

Title III—Low-Rent Public Housing—amends the United States Housing Act of 1937 by authorizing Federal contributions and loans enabling the construction of 810,000 additional units of low-rent public housing over a 6-year period. This compares with the 191,700 low-rent public housing units existing throughout the country on April 30, 1949.

The Public Housing Administration and local housing authorities have the responsibility for the development of these units. There are, however, many considerations such as site selection, plumbing and building codes, water and sewerage facilities, garbage and refuse collection and disposal, insect and rodent control, and other environmental problems that are closely related to health. Furthermore, there are many sanitary engineering, design, construction, and management problems inherent in these developments. Health departments can furnish technical advice that not only is important public healthwise but also has economic benefits. Doubtless, local health departments may be expected to assist with these and similar matters (*4*).

Experience has shown the mutual benefits of coordinated health and housing programs in the realization of on-site clinics, more effective housing maintenance, health education, and other programs. Concerted action of health and housing officials in this program can develop maximum beneficial results to the community (*5*).

The act repeals the equivalent elimination requirements of the United States Housing Act of 1937 and substitutes a modified requirement in which health departments may be expected to participate. To qualify for financial assistance, unsafe or insanitary dwellings substantially equal in number to the newly constructed dwelling units must be eliminated within 5 years, or in some cases a longer period. (This is not true in certain cases under Title I or in rural nonfarm areas.) Here, again, the Appraisal Method for Measuring the Quality of Housing is one of the few objective tools for administrative use. Utilization of this method will enable health departments to form the basis for a program of rehabilitation and elimination of the dilapidated and substandard housing units which have caused them serious concern for many years. If local housing surveys are planned, care should be taken to assure that health, housing, and redevelopment authorities will not be working at cross purposes in their data-collection process.

Title IV—Housing Research—provides for a comprehensive housing research program to be supported by Federal funds. The program is for the encouragement of better housing at lower costs through improved techniques, materials, methods and through improved building codes, and includes the development of more adequate housing data and standards. Authorization is provided to undertake and conduct technical research and studies relating to appraisal of housing, housing need, site planning and utilities, zoning and other laws, codes and regulations as they apply to housing, etc. The Housing and Home Finance Agency has the responsibility for the housing research program. However, the act directs the Administrator to utilize to the fullest extent available facilities elsewhere in the Federal Government and authorizes him to cooperate with industry and labor, with State and local agencies, and with educational institutions and other nonprofit organizations.

The Public Health Service has already undertaken research on septic tanks in cooperation with the Housing and Home Finance Agency. It is possible that additional projects may be undertaken. Although most of the research necessarily will be of the applied or engineering type, certain basic research of the medical-social type may also be included. For example, important gaps exist in the knowledge of the relationship of the physical environment to mental health and the relation of housing design to the problems of the chronically diseased and the aged. Broadly interpreted, this title includes many of the health interests related to housing. There is no statutory limitation on the amount that may be appropriated for housing research.

Title V—Farm Housing—authorizes the Secretary of Agriculture

to extend financial assistance in the form of loans, subsidies, and grants to farm owners to construct, improve, alter, repair, or replace dwellings and other farm buildings, to provide themselves and their tenants with decent, safe, and sanitary living conditions and adequate farm buildings. To finance these aids, the act authorizes Congress to appropriate up to $250 million in loan funds, annual contributions up to $5 million per year, and up to $25 million for grants and other loans.

It is significant that for the purpose of this act, a farm has been defined as a parcel of land operated as a single unit which produces agricultural commodities for sale and for home use with a gross annual value of at least $400 in terms of 1944 prices. The United States Housing Census of 1940 and other data repeatedly show that water and sewerage facilities on farms and rural nonfarm units are frequently deficient or absent. Over half the new housing units built in 1948 were located in areas where public sewer systems were not available.

To qualify for loan assistance under this title, an applicant must show that in addition to being without personal resources and unable to secure credit, he is the owner of a farm which is without a decent, safe, and sanitary dwelling. This, of course, would include a potable water supply and satisfactory sewage disposal facilities. As a result of these conditions, it is presumed that a considerable part of the demand under this title may come from the very small "farms" existing in suburban or urban-fringe areas where water and sewerage problems are of paramount concern to health departments. This title may, therefore, be helpful in correcting sanitation problems in urban-fringe areas provided local health departments are prepared to assist owners in utilizing these provisions.

Many of the requests for loans or parts thereof may be for sanitary facilities. The Farmers Home Administration, the agency designated by the Secretary of Agriculture,to administer Title V, operates through State offices and subunits thereof. At present, they are not fully staffed to handle these types of problems. Obviously, therefore, State and local health departments will be expected to assist and should be prepared to cooperate with the Farmers Home Administration in this important sanitation problem.

Title VI—Miscellaneous Provisions—provides for a decennial census of housing, amendments to the National Banking Act, the National Housing Council amendment, and other special and general provisions. An important provision from the public health viewpoint is that the Federal Security Administrator, or his designee, and the Secretary of Labor, or his designee, have been added to the membership of the National Housing Council of the Housing and Home Finance Agency.

A recent agreement sets forth the basis for cooperation between the

Housing and Home Finance Administrator and the Surgeon General of the Public Health Service. The importance of the relationship of health and housing is becoming more widely recognized daily. The problem of interpreting and integrating the health aspects of housing has important implications in relation to the control of communicable diseases, the furtherance of environmental health, and the promotion of positive healthful living. To do this job, the health profession must be more fully cognizant of and prepared to accept traditional responsibilities.

This unusual opportunity for benefiting the health of the Nation, through the coordination of health and housing programs, is especially important to the health profession. It will require extended activity by health departments to achieve the maximum benefits, but the attainment of the goal will justify the effort.

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Physiological Aspects of Better Housing

By HEINZ SPECHT, Ph. D., and PAUL A. NEAL,* M. D.

The constitution of the World Health Organization states: "Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity."

It is generally accepted that there is a relationship between housing and disease. A causal relationship can be shown to exist between specific diseases and poor housing with unsafe water supplies and sewage-disposal facilities. Both public and private housing are involved, although the most impressive findings have naturally been made in multiple housing of the "tenement" type. However, the coexistence of a low level of public health and bad housing conditions does not necessarily prove that the former is caused by the latter. It may be said without serious reservation that factual data do not exist that demonstrate the exact effects of good or bad housing per se on the incidence and course of illnesses of the occupants, since poor housing has not been separated from other attributes of poverty, such as malnutrition and lack of medical care.

Therefore, since no precise quantitative measurements have been made on the relationship of a disease to housing, the question is, "Can studies of the physiological aspects of the hygiene of housing be expected to give precise information on the physical well-being of the occupants?" A general analysis of the problems may clarify the present position which this field of research occupies.

Physiology is the science which deals with the functions of the living organism and its parts. Hygiene is the science of health and its preservation. Thus, the physiological approach to these problems involves the study of the range of human functions which are affected by housing as contrasted to the usual approach which involves the study of the relationship of a disease entity to housing. The integrated details of such physiological approaches include consideration of comfort and morale.

The adaptability of the several functions of the body to the environment, as housing limits such an environment, varies from one individual to another. The range of such adaptability is greatest in health and proportionately limited by various illnesses. For example, the lower limit of temperature to which the clothed body can adapt itself

*Laboratory of Physical Biology, Experimental Biology and Medicine Institute, National Institutes of Health, Bethesda 14, Md. Presented at the orientation course in the hygiene of housing, Training Division of the Communicable Disease Center, Atlanta, Ga., May 3, 1949.

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by increasing its metabolism without shivering is lower in health than in illness. Consequently, the imposition of a temperature lower than such a limit presents a tax on the resources of the body which is especially heavy in illness. The attention of medical science has long been directed to the necessity for observing a rather narrow temperature range in the treatment of disease, but the desirability of considering the effect of temperature on well-being has only recently been advanced. We have intentionally separated illness from well-being and comfort, but there is no proof that violation of the latter does not constitute an introduction to the former. Thus, well-being and comfort cannot be considered wholly as luxuries.

If housing were to be considered in connection with production, the problem could be quantitatively attacked by measurements of efficiency. There has been developed recently an appreciation of the necessity of more accurately designing all types of machinery and equipment for use by human beings around the skills, abilities, and physiological requirements of the human being. In an attempt to utilize this contribution to engineering development and design, it immediately becomes evident that even the more simple and common physiological aspects of the human being are not well enough known statistically to serve as a design basis. Consequently, the new field of human engineering undertakes to provide the essential elements on which to base intelligent design. In the problem of housing, the need for human engineering extends over a wide range of physiological characteristics.

The definitive limits of the various environmental factors affected by housing should determine the steps to be taken in designing and constructing houses from the human point of view. There would be no difficulty in convincing anyone of the necessity for full consideration of physiology in housing, if the situation were as acute and fraught with danger as, for instance, the biodynamic design of the cockpits in airplanes is on the successful operation of our newer aircraft. However, a 6-foot woman working over a 2½-foot kitchen sink is acutely aware of discomfort. The continuing character of these seemingly minor aspects of housing lends considerable weight to their effectiveness in causing poor physiological conditions as well as home accidents.

The physiological approach to criteria of adequate housing must be based on the study of various human functions as they are affected by the environment which houses may provide.

We may begin by investigating such a fundamental function as body temperature maintenance in the face of various air temperatures, radiant heat levels, air humidity levels, and ventilation velocities. This is an active field of investigation in which good methods were evolved during World War II for judgment of extreme con-

ditions, as in arctic and tropical environments. Judgments are based on tolerance for various periods of time, and also, within the limits of tolerance, on comfort and perception of change. In the maintenance of body temperature the tax on the metabolism in cool environments is assessable through measurement of oxygen consumption The criterion for what limits may be allowable, where they do not entail appreciable discomfort, may be set by economic considerations of caloric diet versus central heating.

Of public interest are studies on the effects of sudden change in environmental temperature such as result from leaving and entering air conditioned buildings and the associated problem of the effects of spending part of one's time at one temperature level and part at another. Such conditions exist now for a great many people employed in large office buildings and manufacturing plants as well as theaters and stores. Basic physiological information will have to be obtained under controlled conditions in order to analyze these problems.

On the other hand, the maintenance of body temperature in warm environments taxes the heart and circulation. The circulatory regulation is the principal physiological factor in ridding the body of its metabolic heat via radiation, convection, and evaporation. What limit to set on cardiac work short of an acute sense of discomfort requires inquiry into the chronic effects of increased cardiac work on general fatigue. In cardiac conditions added stress certainly produces abnormally adverse effects. The importance of proper home environment for adequate sleep cannot be over emphasized in the management of persons with physiological impairment. Diverse small stresses are additive and may thus constitute the deciding factor between physiological adaptation and dysfunctions ranging to death. Current interest in heart function is setting the pace for thoroughgoing methods of research in this field.

The matter of ventilation is difficult to assess, but one may use functional attributes of the body as critical factors which demand certain levels of ventilation beyond those involved in temperature regulation. Take, for example, the basic matter of odors. To insist on ventilation in a house which will eliminate warning odors and smokes is at cross purposes to safety, as well as undesirable from the point of view of air motion and heat economy. It is of prime importance that proper local ventilation in cooking be provided, and it is also desirable to make provision for adequate general ventilation to reduce other odors to undetectable levels. What these adequate levels are can only be determined by studies in the detection of, and adaption to, odors by the human olfactory organs. The study of odor perception and the quantitative chemical or physical estimation of odorous substances in the air is still in a rudimentary state, mainly through the

lack of suitably sensitive and discriminatory devices. It is probable that such studies will progress more successfully now that radioactive labeling of odorous substances is feasible.

The criteria for optimum humidity levels have been set by considerations other than their effect on the efficiency of the respiratory system in protecting against bacterial invasion. Such functions are currently recognized to be markedly susceptible to changes in humidity. In addition, studies in bacterial survival show that rapid decline in viability may be effected in environments of optimal humidity. Thus, both the incidence of infectious agents and susceptibility to infection may be reduced by proper humidity maintenance.

A great deal has been published, both in the popular press and in the scientific literature, regarding air-borne diseases and their control through specific physical or chemical devices. Most of the studies were made to test such particular devices. These can only be applied to disease organisms which are suspended in the atmosphere in finely dispersed form, either directly or by resuspension. The part played by this type of infection in the transmission of disease has yet to be quantitatively established under laboratory conditions. The epidemiological approaches to this question made in the past are indeterminate, because they necessarily involve other modes of disease transmission than by air.

The high incidence of attacks of hay fever and asthma in the general population is principally caused by dusts and pollens. The elimination of dusts and pollens from the house environment will reduce materially the debilities and discomfort produced by such substances. It seems possible that with recent advances, filtration and precipitation of air-borne dusts and pollens is economically feasible at the housing level.

Numerous studies indicate that poor illumination has deleterious effects on efficiency and comfort, and is the cause of a great number of home accidents. Conclusive information on the causal relationship between poor illumination and organic injury of the eye is not available. Current information on the relation between illumination and healthy vision indicates that present lighting standards are based largely on practical experience as to comfort and to some extent on efficiency. Until adequate physiological principles can be applied to this field there will always be a great diversity in home lighting, which is often not suited to particular home tasks. The problem of what constitutes the proper intensity of illumination should be dictated by the nature of the task, and to some extent by the characteristics of the individual, such as age and correction of visual defects. Many properties of illumination, other than intensity on the work, are of prime importance. These include direction, distribution over the

surrounding areas, reflectance of surfaces in the range of vision, and color of light and objects. Both artificial and natural light must be built into houses since illumination affects all our conscious functions. The absence of natural light, while it may be advantageous from an engineering point of view, both thermally and otherwise, is not compatible with either aesthetic or sensible comfort in the opinion of many people. This is evident to real estate dealers who know that natural light in its various aspects such as "sunshine" and "views" is a potent criterion in the free choice of houses and apartments.

A host of practical problems involve the performance of muscular work. Usually these are well within the physiological range and thus not readily assessed by the usual techniques of oxygen consumption and ergometer measurements. The definitive factors in muscular effort in home activities will lie in the relative convenience or ease of carrying out repetitive acts. The criteria are then not muscular potential but psychomotor relationships which may be critically affected by certain mechanical principles. Thus the cleaning of floors, walls, and furniture, as well as the preparation of meals, can be drudgery of the most appalling sort and evoke vociferous complaint. Not all of this is attributable to disinclination for the job, but is in reality due to improper functional arrangement for human performance.

Industrially, noise is recognized as deleterious to efficient operation. Good engineering practice indicates that noise elimination at the source, isolation by soundproofing, and other methods of noise reduction are demanded from the economic standpoint. The harmful effects of noise are particularly obvious in multiple dwellings where interference with proper rest is probably the primary consideration. Thus methods of sound control and the establishment of suitable levels of sound intensity are problems which must be dealt with on an experimental basis.

The various approaches discussed above have been made in an uncoordinated fashion as regards their application to housing. The special requirements of houses in providing a physiologically suitable environment for work and rest, and the tremendous numerical need for improved housing require a concerted program of research in which those particular phases which apply to houses can be intensively prosecuted. The great advances in construction of houses and also recent developments in the field of human engineering require that the physiological aspects of better housing be vigorously investigated. The long-range nature of certain aspects of this problem, and the fundamental character of many of the variables which have been discussed call for a continuing program of research. The integration of the necessary disciplines can best be carried out in a laboratory devoted to the study of the physiological aspects of housing.

Serological Characteristics of a Pathogenic Rickettsia Occurring in *Amblyomma maculatum*

By D. B. LACKMAN, Ph. D., R. R. PARKER, Ph. D.,† and R. K. GERLOFF, M. A.*

A survey to determine the distribution of the rickettsia of Rocky Mountain spotted fever in the tick species of eastern Texas was made in 1937 by the Rocky Mountain Laboratory. During this study, two strains of a rickettsia, pathogenic for guinea pigs, were isolated from ticks (*Amblyomma maculatum*) collected from cattle near Cleveland, Texas (*1*). Since then, isolations also have been made from *A. maculatum* collected in Georgia in 1938 (*2*), in Mississippi in 1948 (*3*), and in Texas.

The disease produced in guinea pigs and the cultural characteristics and immunological relationships of this agent were first described by Parker, Kohls, Cox, and Davis in 1939 (*1*). The name "maculatum disease" was given to the syndrome produced in guinea pigs.

Although guinea pigs inoculated with either the rickettsia of Rocky Mountain spotted fever (western strains were used) or that isolated from *A. maculatum* were immune when subsequently challenged with the other rickettsia, the following differences in the reactions of guinea pigs to these two rickettsiae have been noted (*1*, *2*).

1. Maculatum disease is characterized by mildness (never fatal), a short febrile period, and a swollen, pinkish scrotum (sometimes there is a typical scrotal reaction, but no fever). Whereas, spotted fever usually is much more severe with a longer and more marked febrile period. It is often fatal, and the scrotum usually becomes purplish red and is frequently necrotic (scrotal involvement does not occur in animals injected with the occasionally encountered natural strains that produce an afebrile response).

2. Guinea pigs vaccinated against spotted fever are not protected against maculatum disease.

3. A considerable percentage of guinea pigs after recovery from maculatum disease or murine typhus show a marked degree of cross immunity when inoculated with rickettsiae of the other disease. This cross immunity is most marked when murine typhus recoveries are challenged with maculatum rickettsiae. There is no marked cross immunity between spotted fever and murine typhus. These same findings have recently been repeated by Parker with strains of maculatum disease isolated from *A. maculatum* collected in Mississippi in 1948 (*3*).

This report describes the results obtained in a serological study of

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the rickettsia of maculatum disease, particularly with respect to its relationship to rickettsiae of the spotted fever group.

The methods used were: first, an analysis of the antigenic structure by injection of infectious guinea pig tissue into rabbits, according to the method originally outlined by Felix in 1933 (*4*) and also used by Davis (*5*); and second, a study of the complement-fixing reactions of guinea pig antisera first recommended by Plotz (*6*) as a means of identifying newly isolated rickettsial agents.

Felix observed that rabbits receiving one injection of a specific rickettsia usually responded with the production of *Proteus* agglutinins. When the same species was reinjected into the rabbit after an interval of 30 days, there was no further production of agglutinins. If, however, the second injection was made with a heterologous rickettsia there was a marked restimulation of *Proteus* agglutinins.

Plotz and co-workers used the reactions obtained in complement fixation tests of sera from guinea pigs convalescing from rickettsial infections as a means of identifying newly isolated strains. They pointed out that the identification of strains of epidemic and murine typhus or Rocky Mountain spotted fever on the basis of clinical findings alone is insufficient, and that the use of complement fixation reactions permits the detection of inapparent infections as well as the elimination of those animals developing fever from nonspecific causes. Their method consisted of inoculating guinea pigs with infectious material, bleeding them either 14 days after their temperature returned to normal or 28 days following injection, and performing complement fixation tests with the serum using purified rickettsial suspensions as antigens.

In using the method of Felix to study the relationship between the rickettsiae of a *Dermacentor andersoni* strain of Rocky Mountain spotted fever and of maculatum disease, six rabbits were each inoculated intraperitoneally with 2 ml. of blood from guinea pigs infected with spotted fever, and six were inoculated with 3 ml. of a suspension of tunica vaginalis from a guinea pig infected with maculatum disease (tunica vaginalis is more uniformly infectious in this disease than is blood). The production of *Proteus* agglutinins and complement-fixing antibodies was studied by bleeding the rabbits 15, 22, and 29 days after injection. The agglutinin response is shown in figure 1. No significant titer of *Proteus* agglutinins was produced in the rabbits injected with the rickettsia of maculatum disease. This confirms the earlier work of Parker (*2*) and, in this respect, places maculatum disease in the same category as North Queensland tick typhus (*7*) and boutonneuse fever (*5*), although complement fixation definitely places all of these rickettsiae in the spotted fever group. It is possible that the failure of this rickettsia to produce agglutinins is due to its low virulence for rabbits, since Felix's studies suggested that rabbits must

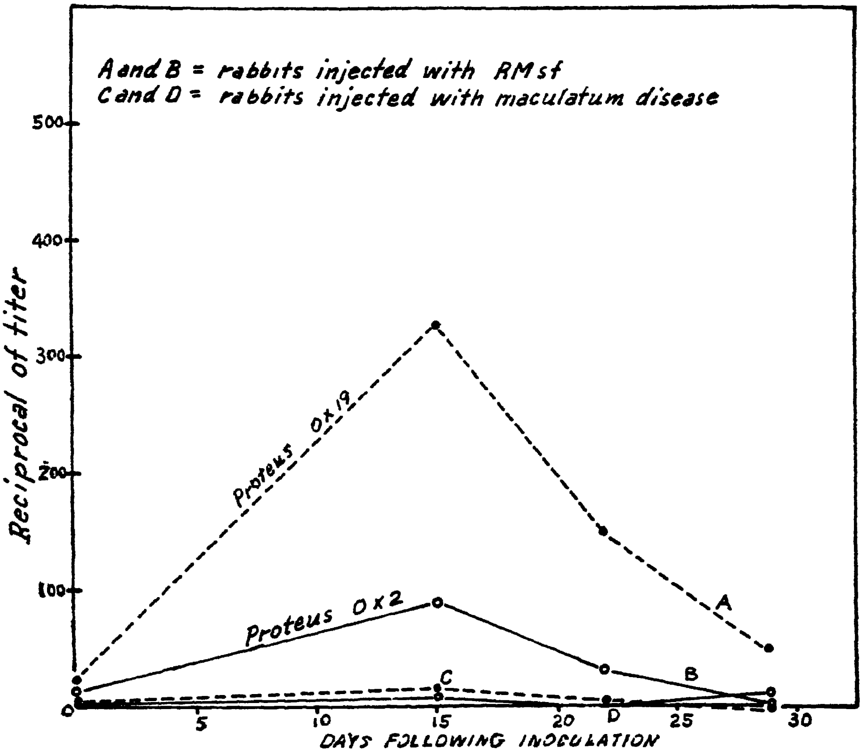

Figure 1. Average Weil-Felix agglutinin response in 6 rabbits injected with the rickettsia of Rocky Mountain spotted fever and in 6 rabbits injected with the rickettsia of maculatum disease.

undergo a frank infection with rickettsial diseases in order to produce *Proteus* agglutinins.

The rabbits injected with spotted fever rickettsiae showed some rise in temperature and slight scrotal swelling, whereas, those injected with maculatum disease rickettsiae failed to show any clinical indications of infection. The viability of the inocula used in our experiments was proved by simultaneous injection of guinea pigs.

The group of six rabbits originally injected with Rocky Mountain spotted fever rickettsiae responded with the production of agglutinins for *Proteus* OX_{19} and OX_2. These reached a maximum titer about 15 days after inoculation and fell to a low level by the 29th day. These rabbits were divided into two groups of three each, those of one group being challenged with spotted fever rickettsiae and those of the other with maculatum disease rickettsiae 30 days following the initial injection. At the same time, three normal rabbits were injected with each rickettsia to serve as controls. Blood specimens were again taken at 2-, 3-, and 4-week intervals and the serums were titrated for *Proteus* agglutinins and complement-fixing antibodies.

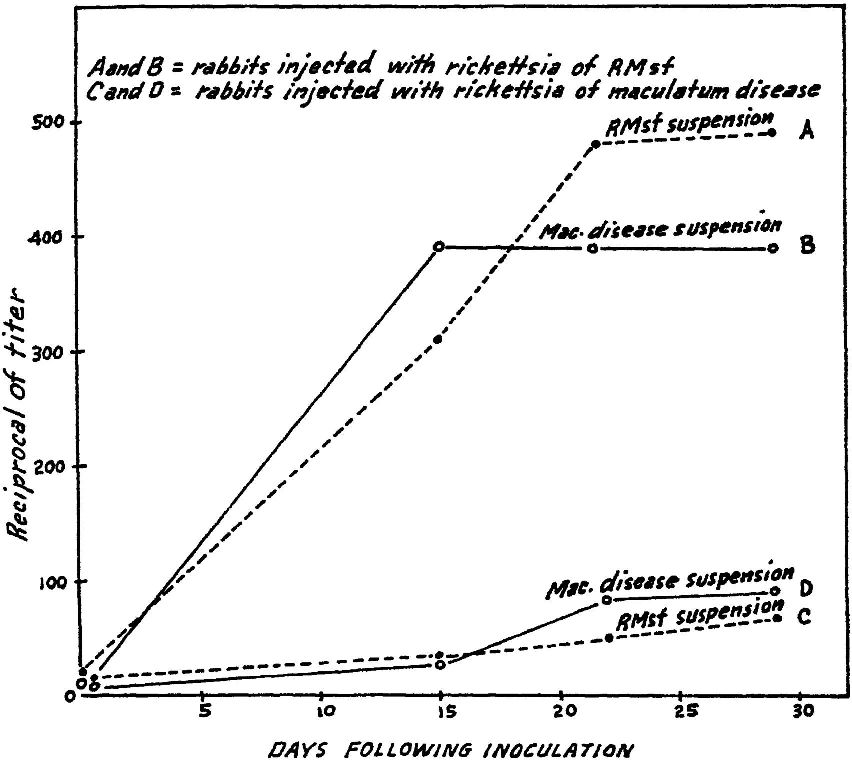

Figure 2. Average complement fixation response in 6 rabbits injected with the rickettsia of Rocky Mountain spotted fever and in 6 rabbits injected with the rickettsia of maculatum disease.

There was no further production of *Proteus* agglutinins in the challenged rabbits. It would appear that the original injection had "immunized" these animals against the second injection of rickettsiae as far as responding with further production of *Proteus* agglutinins was concerned. According to Felix (*4*), if the second injection had been made with a strain of different antigenic structure from the one used in the original infection, there would have been a further stimulation in the production of agglutinins. In this instance, however, we have the added complication that maculatum disease rickettsiae failed to produce *Proteus* agglutinins in rabbits on first injection.

The six rabbits originally injected with maculatum disease rickettsiae were likewise divided into two equal groups, one group being challenged with spotted fever rickettsiae and the other group with maculatum disease rickettsiae. Neither group of rabbits developed *Proteus* agglutinins. The failure to demonstrate *Proteus* agglutinins in the rabbits challenged with spotted fever indicates, according to the criteria of Felix, that these two strains are identical. However, it

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must be realized that here we are dealing solely with the antigenic groupings responsible for the production of *Proteus* agglutinins. In the section to follow, in which the groupings giving rise to complement-fixing antibodies are studied, differences between spotted fever rickettsiae and maculatum disease rickettsiae are observed. It seems to be difficult to completely separate these two reactivities. Washing the rickettsial suspensions increases the species-specific reactivity but does not completely eliminate the broader, spotted fever group reaction.

Suspensions of the rickettsiae of Rocky Mountain spotted fever, maculatum disease, murine typhus, and Q fever were used in testing, by complement fixation, the sera obtained from these rabbits. The results with spotted fever and maculatum disease antigens are shown in figure 2. The six rabbits injected with spotted fever rickettsiae showed a progressive rise in average titer against either antigen to about 1:450 by the 29th day. In contrast to this, the six injected with maculatum disease rickettsiae showed a rise in titer to only 1:80. This striking difference in complement-fixing antibody response is probably due in part to the difference in the degree of infectiousness of the two rickettsiae for rabbits, as previously suggested in connection with the Weil-Felix results.

The results following challenge are shown in figure 3. Challenge with either the rickettsia of spotted fever or that of maculatum disease did not appreciably alter the complement-fixing response of the rabbits initially injected with spotted fever organisms. Likewise, the homologous challenge inoculation did not appreciably alter the response of the rabbits initially injected with the rickettsia of maculatum disease. But, when the rabbits originally given maculatum disease rickettsiae were challenged with spotted fever rickettsiae, the response was the same as that obtained in the rabbits initially injected with spotted fever organisms, the titer rising to 1:1024. This indicates that the initial injection with the maculatum disease rickettsia did not produce resistance to challenge with that of spotted fever.

The second method of approach, that suggested by Plotz, involved a study of the complement-fixing reactions of convalescent guinea pig sera, taken between the 20th and 30th days following infection, with various rickettsial antigens. The antigens were prepared from infected yolk sacs according to method II of Topping and Shepard (*8*). The soluble antigens represent the supernatant following removal of the rickettsiae by centrifugation. The tests were performed over a period of 2 years with more than 70 antigens prepared with seven rickettsial agents. Table 1 shows the reaction of maculatum disease antisera with the various rickettsial antigens. The reactions of these

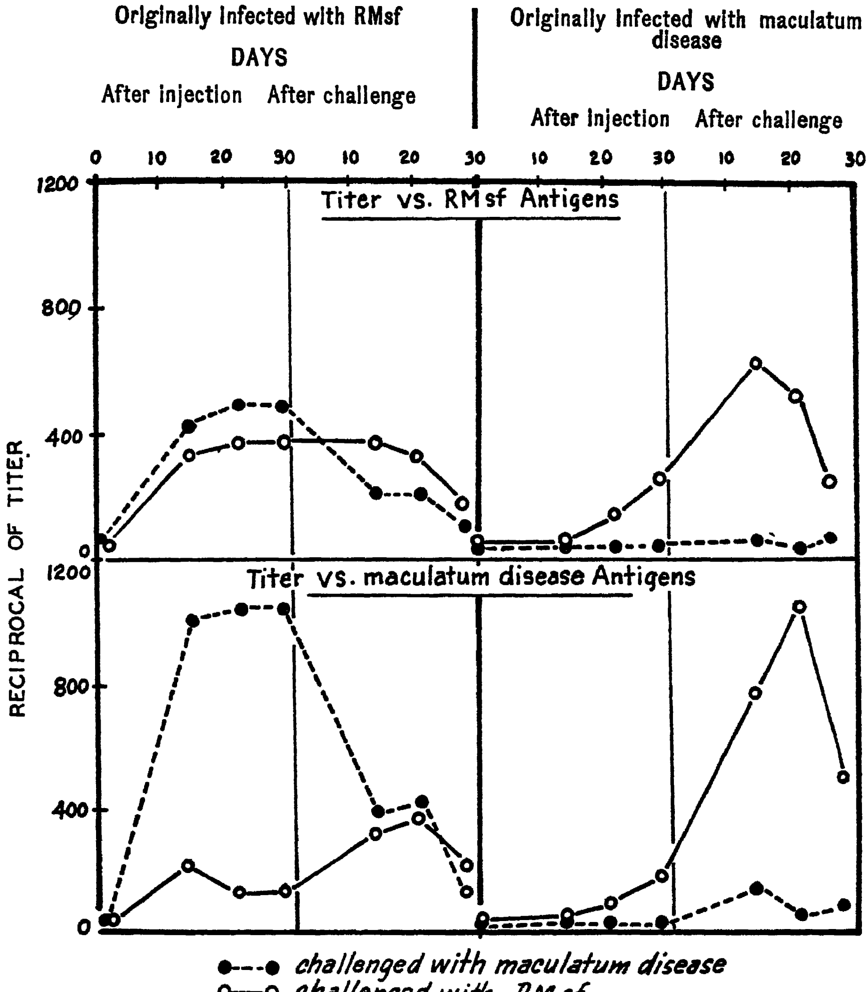

Figure 3. Average complement-fixing response in rabbits following challenge.

antigens with their homologous antisera are given for comparison. It has been difficult to get a satisfactory washed rickettsial suspension of the maculatum disease rickettsia, and at the time these results were assembled, no such preparation was available. Likewise, no satisfactory boutonneuse fever antigen was available. However, in previous tests, we had observed that South African tick-bite fever gave reactions in complement fixation similar to those obtained with boutonneuse fever; therefore, the results presented in the table for South African tick-bite fever are probably similar to those which would have been obtained with boutonneuse fever.

The reactions obtained indicate that the maculatum disease rickett-

Table 1. *Reaction of maculatum disease guinea pig antisera with rickettsial antigens*

Antigen	Dilution of antiserum giving complete fixation with 2 units of antigen	
	Maculatum disease antiserum[1]	Homologous antiserum[1]
North Queensland tick typhus (soluble antigen)	1:64	1:248
North Queensland tick typhus (rickettsial suspension)	0	126
South African tick-bite fever (soluble antigen)	64	256
South African tick-bite fever (rickettsial suspension)	8	64
Rocky Mountain spotted fever (soluble antigen)	72	339
Rocky Mountain spotted fever (rickettsial suspension)	14	240
Rickettsialpox (soluble antigen)	64	129
Rickettsialpox (rickettsial suspension)	4	166
Maculatum disease (rickettsial suspension)[2]	328	----------
Murine typhus	0	512
Q fever	0	416

[1] Average of 20 tests. [2] This was a crude suspension.

sia definitely belongs in the spotted fever group. Although some cross reactions were obtained with suspensions of rickettsiae belonging to the spotted fever group, the homologous reaction of the maculatum disease suspension is considerably stronger and is sufficient to indicate that this strain is antigenically different from the other strains of the group. Specificity such as that shown in table 1 is often difficult to demonstrate in individual tests. It is only by considering several tests that a true picture of the reactivity is obtained.

The reactions obtained between the rickettsiae of spotted fever and maculatum disease and their antisera are given in table 2. It will be noted that the homologous reactions are significantly higher. However, the homologous maculatum disease reactions are consistently lower than homologous spotted fever reactions. Maculatum disease infection almost always results in a lower titer of complement-fixing antibody in the guinea pig, probably because of the mildness of the infection.

Emphasis has been placed on the relationship between the rickettsia of maculatum disease and that of spotted fever because both rickettsiae are resident in the tick population in one portion of the United States in which spotted fever is endemic, i. e., the portion comprising the South Central and the Southeastern States. In this region, the rickettsia of spotted fever is resident in *Dermacentor variabilis*, *Amblyomma americanum*, and *Haemaphysalis leporis-palustris*, and that of maculatum disease in *Amblyomma maculatum*. There is no

Table 2. *Complement fixation between spotted fever and maculatum disease suspensions and their antisera*

Antigen	Dilution of sera giving complete fixation [1]	
	Rocky Mountain spotted fever	Maculatum disease
Rocky Mountain spotted fever No. 188	$\boxed{1:288}$	1:32
Maculatum disease No. 185	1:32	$\boxed{1:64}$
Rocky Mountain spotted fever No. 193	$\boxed{1:288}$	1:48
Maculatum disease No. 192	1:40	$\boxed{1:72}$

[1] These figures represent the average titer obtained with two antisera.

present evidence that the rickettsia of maculatum disease occurs in *D. variabilis*, *A. americanum*, or *H. leporis-palustris* or that the rickettsia of spotted fever occurs in *A. maculatum*.

Summary and Conclusion

A serological study has been made of a rickettsia recovered from ticks (*Amblyomma maculatum*) collected in Texas, Georgia, and Mississippi. The reactions obtained place it in the Rocky Mountain spotted fever group of rickettsiae. This agrees with previous findings. Results obtained in rabbits and guinea pigs indicate that it is less virulent for these animals than are most *Dermacentor andersoni* or *D. variabilis* strains of spotted fever. Analysis of sera for complement-fixing antibodies demonstrates that this rickettsia is related in antigenic structure to Rocky Mountain spotted fever but is not identical with it or any other known member of the spotted fever group.

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Industrial Sickness Absenteeism

Males and Females, 1948, and Males, First and Second Quarters, 1949

By W. M. GAFAFER, D.Sc.*

Quarterly reports have appeared presenting data for 1948 on sickness and nonindustrial injuries disabling for more than 1 week among a group of 200,000 male workers (*1*, *2*). This report is concerned with the experience of males and females in 1948 and earlier years, and of males during the first and second quarters of 1949. Basic data are derived from reports of industrial sick benefit associations, company relief departments, and group health insurance plans. The last report covering females appeared in 1948 (*1*).

Males and Females, 1948 and Earlier Years

Frequency rates for males and females are given by cause in table 1 for 1948, 1947, and the 10-year period 1939–48. During the year 1948, a total of 104.5 absences per 1,000 males and 257.2 absences per 1,000 females were recorded for all sickness and nonindustrial injuries disabling for 8 calendar days or longer. Among males, 32.4 absences per 1,000 persons were reported for respiratory diseases, 17.4 absences per 1,000 for digestive diseases, and 42.6 for nonrespiratory-nondigestive diseases including ill-defined and unknown causes. The corresponding rates for females are 104.5, 31.1, and 101.9, respectively. It is of interest to observe that the rate yielded for the group of respiratory diseases among females equals the rate for all causes among males.

An examination of corresponding male rates for 1948 and 1947 reveals that with the exception of a 33 percent decrease in the 1948 frequency of influenza and grippe, and the reflection of this decrease in rates for the group of respiratory diseases and all causes, the frequency of specific causes is remarkably stable in the 2 years. In both 1948 and 1947, the male rate recorded for all sickness and nonindustrial injuries is less than the corresponding rate for the 10-year period, 1939–48, a difference due principally to decreases in frequency of a number of respiratory diseases.

Among females, the 1948 frequency of all causes and of each of the broad cause groups is similar in magnitude to the corresponding rate for 1947, the rates in both years being well above the corresponding rates for 1939–48. This relationship is not maintained however by a number of the specific causes. Thus, it will be observed in table 1

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Table 1. *Annual number of absences per 1,000 persons on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by cause; experience of* MALE *and* FEMALE *employees in various industries, 1948, 1947, and 1939–48, inclusive* [1]

Cause [2]	Annual number of absences per 1,000 persons beginning in specified period					
	Males			Females		
	1948	1939–48 [3]	1947	1948	1939–48 [3]	1947
Sickness and nonindustrial injuries	104.5	115.0	111.9	257.2	208.4	260.4
Percent of female rate	*41*	*55*	*43*			
Percent of male rate				*246*	*181*	*233*
Nonindustrial injuries (169–195)	12.1	11.9	11.7	19.7	15.2	18.2
Sickness	92.4	103.1	100.2	237.5	193.2	242.2
Respiratory diseases	32.4	44.3	38.6	104.5	86.1	107.2
Tuberculosis of respiratory system (13)	.6	.7	.6	.4	.6	.5
Influenza, grippe (33)	10.4	18.5	15.6	31.9	32.1	41.6
Bronchitis, acute and chronic (106)	5.9	6.9	5.8	13.0	9.9	10.5
Pneumonia, all forms (107–109)	4.3	4.8	4.0	4.4	2.8	3.8
Diseases of pharynx and tonsils (115b, 115c)	3.6	5.1	4.0	17.6	15.2	16.0
Other respiratory diseases (104, 105, 110–114)	7.6	8.3	8.6	37.2	25.5	34.8
Digestive diseases	17.4	16.9	17.5	31.1	29.0	33.4
Diseases of stomach except cancer (117, 118)	5.7	5.3	5.5	4.1	3.0	3.8
Diarrhea and enteritis (120)	2.2	2.0	2.3	6.8	4.7	7.8
Appendicitis (121)	3.6	4.3	3.7	9.6	13.2	11.3
Hernia (122a)	2.5	2.1	2.4	1.4	.6	.7
Other digestive diseases (115a, 115d, 116, 122b–129)	3.4	3.2	3.6	9.2	7.5	9.8
Nonrespiratory-nondigestive diseases	39.7	38.5	40.6	97.0	73.3	96.9
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44) [4]	2.6	2.5	2.4	5.9	4.6	4.4
Cancer, all sites (45–55)	.6	.5	.6	.7	.5	.6
Rheumatism, acute and chronic (58, 59)	4.1	4.5	3.9	5.0	3.9	4.5
Neurasthenia and the like (part of 84d)	1.8	1.7	1.9	11.0	10.1	11.7
Neuralgia, neuritis, sciatica (87b)	2.3	2.6	2.4	2.7	2.7	2.3
Other diseases of nervous system (80–85, 87, except part of 84d, and 87b)	1.6	1.6	1.7	2.1	1.5	1.8
Diseases of heart (90–95)	4.3	3.7	4.4	1.9	2.1	2.9
Diseases of arteries and high blood pressure (96–99, 102)	2.1	1.8	2.3	1.4	1.2	1.3
Other diseases of circulatory system (100, 101, 103)	3.9	3.6	4.1	6.3	4.7	6.9
Nephritis, acute and chronic (130–132)	.3	.4	.4	.5	.4	.6
Other diseases of genitourinary system (133–139)	3.2	2.9	3.1	25.9	16.0	24.4
Diseases of skin (151–153)	3.5	3.3	3.7	6.1	5.0	6.3
Diseases of organs of movement except diseases of joints (156b)	3.2	3.3	3.4	6.8	4.3	6.1
All other diseases (56, 57, 60–79, 88, 89, 154, 155, 156a, 157, 162)	6.2	6.1	6.3	20.7	16.3	23.1
Ill-defined and unknown causes (200)	2.9	3.4	3.5	4.9	4.8	4.7
Average number of persons	218,419	2,405,755	216,471	20,728	217,699	21,021

[1] Industrial injuries and venereal diseases are not included.
[2] Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939.
[3] Average of the 10 annual rates.
[4] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

that the 1948 frequency of influenza and grippe (31.9) was almost 25 percent below the rate for 1947 (41.6), and almost the same as the mean rate for the 10 years (32.1).

Males, First and Second Quarters, 1949

Table 2 presents male frequency rates by cause for the first and second quarters of 1949 and 1948. Attention is particularly directed to decreases in the first quarter of 1949 in frequency of all sickness and nonindustrial injuries, the group of respiratory diseases, and influenza

Table 2. Number of absences per 1,000 males (annual basis) on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by cause; experience of MALE *employees in various industries, first and second quarters of 1949* [1]

Cause [2]	Number of absences per 1,000 males (annual basis) beginning in specified period						
	Second quarter		First quarter		First half		
	1949	1948	1949	1948	1949	1948	1944–48
Sickness and nonindustrial injuries	84.9	99.7	117.4	129.5	101.2	114.5	135.3
Nonindustrial injuries (169–195)	8.7	12.6	11.7	12.6	10.2	12.6	12.3
Sickness	76.2	87.1	105.7	116.9	91.0	101.9	123.0
Respiratory diseases	24.1	27.0	41.4	52.3	32.8	39.6	54.4
Tuberculosis of respiratory system (13)	.7	.7	.6	.6	.6	.6	.7
Influenza, grippe (33)	6.6	7.1	14.9	20.9	10.8	14.0	23.1
Bronchitis, acute and chronic (106)	4.2	5.1	6.1	8.7	5.2	6.9	8.4
Pneumonia, all forms (107–109)	3.7	4.1	5.5	6.7	4.6	5.4	6.1
Diseases of pharynx and tonsils (115b, 115c)	3.4	3.7	5.2	4.4	4.3	4.0	5.5
Other respiratory diseases (104, 105, 110–114)	5.5	6.3	9.1	11.0	7.3	8.7	10.6
Digestive diseases	15.1	17.2	18.6	17.2	16.8	17.2	18.3
Diseases of stomach except cancer (117, 118)	4.7	5.2	5.9	6.3	5.3	5.7	5.9
Diarrhea and enteritis (120)	1.7	2.0	2.5	1.8	2.1	1.9	2.3
Appendicitis (121)	3.4	3.8	4.0	3.0	3.7	3.4	3.9
Hernia (122a)	2.2	3.2	2.7	2.4	2.4	2.9	2.6
Other digestive diseases (115a, 115d, 116, 122b–129)	3.1	3.0	3.5	3.7	3.3	3.3	3.6
Nonrespiratory-nondigestive diseases	34.8	39.2	43.2	43.8	39.0	41.4	45.6
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44) [3]	2.5	3.3	2.9	3.3	2.7	3.3	3.2
Rheumatism, acute and chronic (58, 59)	4.0	4.3	4.5	5.6	4.2	4.9	5.6
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Other diseases of nervous system (80–85, 87, except part of 84d, and 87b)	1.3	1.4	1.9	1.8	1.6	1.6	1.9
Diseases of heart and arteries, and nephritis (90–99, 102, 130–132)	5.6	6.6	7.5	8.0	6.6	7.3	7.9
Other diseases of genitourinary system (133–138)	2.9	3.1	3.2	3.0	3.0	3.1	3.2
Diseases of skin (151–153)	2.7	3.2	3.4	3.2	3.0	3.2	3.4
Diseases of organs of movement except diseases of joints (156b)	2.0	2.9	3.1	3.5	2.6	3.2	3.5
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162)	10.2	10.1	12.4	11.1	11.3	10.6	11.7
Ill-defined and unknown causes (200)	2.2	3.7	2.5	3.6	2.4	3.7	4.7
Average number of males	199,070	199,579	202,289	197,229	200,679	198,404	1,063,484

[1] Industrial injuries and venereal diseases are not included.
[2] Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939.
[3] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

and grippe. A review of first-quarter rates for the group of respiratory diseases during the 10 years, 1940–49, reveals that the rates have decreased steadily from a peak of 97.7 in 1943 to the present rate of 41.4 in 1949, the 1949 rate being more than 40 percent below the 10-year mean of 69.9.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 8, 1949

The incidence of poliomyelitis declined for the seventh consecutive week, from a total of 1,856 cases last week to 1,586 currently, or a decrease of 14.4 percent. However, the current figure is considerably above the 5-year median of 877. The decrease in poliomyelitis incidence was shared by all the geographic divisions in the Nation except the South Atlantic which increased from 64 to 72 cases. Increases were reported in 17 States, with the largest increases (more than 15 cases reported) over last week's figure as follows: Indiana (36 to 62), New Jersey (65 to 85), and Missouri (27 to 42). The 23 States reporting more than 20 cases each are as follows (last week's figures in parentheses): *Increases*—Massachusetts 93 (82), Connecticut 43 (40), New Jersey 85 (65), Indiana 62 (36), Missouri 42 (27), Kansas 23 (21), and Oklahoma 43 (40), Oregon 23 (17); *Decreases*—New York 222 (287), Pennsylvania 32 (47), Ohio 59 (105), Illinois 71 (113), Michigan 90 (134), Wisconsin 61 (68), Minnesota 86 (89), Iowa 37 (56), Nebraska 31 (41), Kentucky 28 (33), Arkansas 24 (26), Texas 52 (67), Colorado 23 (36), Washington 24 (36), and California 110 (117). The total for the year to date is 34,736 as compared with 20,381 for the corresponding period last year and a 5-year median of 15,423.

During the week, 1 case of smallpox was reported in Kansas. The total smallpox cases reported for the year to date is 44, for the same period last year, 51 and a 5-year median of 286. A total of 1,163 cases of influenza was reported for the Nation, a slight increase over last week's figure of 1,019, but less than the median of 1,171. Of the States, Texas and Virginia reported the largest number of cases, 831 and 107, respectively. Texas exceeded the 5-year median of 646 cases. The comparable median for Virginia is 149.

A total of 9,071 deaths was recorded during the week in 94 large cities in the United States, as compared with 8,482 last week, 8,422 and 9,222, respectively, for the corresponding weeks of 1948 and 1947. The 3-year (1946–48) median was 8,630. The cumulative figure for the year to date is 366,876, as compared with 368,429 for the same period last year. The number of deaths under 1 year of age was 646, last week 680, same week last year 601, 3-year median 706. The cumulative total is 26,183, same period last year 26,731.

Telegraphic case reports from State health officers for the week ended October 8, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	-	-	-	13	-	17	12	-	3	-	-	3	3	-
New Hampshire	-	-	-	-	-	2	1	-	-	-	-	-	-	-
Vermont	-	-	-	-	-	-	3	-	-	-	-	-	9	-
Massachusetts	2	-	-	20	-	-	93	-	17	-	-	-	68	-
Rhode Island	-	-	-	-	-	2	10	-	1	-	-	-	8	-
Connecticut	2	-	-	6	-	41	43	-	-	-	-	-	45	-
MIDDLE ATLANTIC														
New York	4	-	[e] 1	33	3	151	222	1	[d] 31	-	-	7	140	17
New Jersey	4	1	1	33	2	56	85	-	12	-	-	1	116	1
Pennsylvania	2	-	(e)	35	2	41	32	-	25	-	-	14	151	1
EAST NORTH CENTRAL														
Ohio	6	-	-	4	-	19	59	-	60	-	-	1	72	5
Indiana	6	1	-	40	-	11	62	-	15	-	-	2	32	9
Illinois	2	-	-	14	3	65	71	-	20	-	-	2	124	-
Michigan [a]	3	1	-	30	3	22	[2] 90	-	33	-	-	1	109	2
Wisconsin	-	-	-	61	-	2	61	-	19	-	-	-	89	-
WEST NORTH CENTRAL														
Minnesota	2	1	-	8	2	6	86	-	13	-	-	-	6	-
Iowa	-	-	-	3	1	1	37	-	7	-	-	-	1	3
Missouri	-	-	4	1	1	18	42	-	6	-	-	1	7	1
North Dakota	-	[1] 4	10	2	-	-	8	-	-	-	-	1	-	-
South Dakota	-	4	-	-	1	-	9	-	2	-	-	-	1	-
Nebraska	-	-	2	3	1	-	31	-	2	-	-	-	3	-
Kansas	1	-	-	4	-	10	23	-	10	1	-	-	9	-
SOUTH ATLANTIC														
Delaware	-	-	-	1	-	-	-	-	-	-	-	1	11	-
Maryland [a]	2	-	1	2	-	20	[2] 10	-	[d] 8	-	-	2	34	-
District of Columbia	-	-	-	-	-	17	4	-	3	-	-	-	2	-
Virginia	4	-	107	7	-	35	12	-	14	-	-	7	25	1
West Virginia	13	-	10	18	1	2	11	-	18	-	-	2	145	-
North Carolina	21	-	-	6	1	-	6	-	95	-	-	4	14	-
South Carolina	18	-	13	6	1	5	3	-	6	-	-	1	-	1
Georgia	27	-	2	1	-	3	16	-	24	-	-	1	-	10
Florida	4	-	4	2	1	10	10	-	1	-	-	-	4	1

EAST SOUTH CENTRAL														
Kentucky	10	---	---	3	1	6	28	---	52	---	---	4	6	9
Tennessee	14	---	16	8	2	28	19	1	69	---	---	6	27	---
Alabama	10	---	12	1	1	22	8	---	25	---	---	---	6	12
Mississippi [a]	13	---	6	---	1	15	17	---	13	---	---	---	2	---
WEST SOUTH CENTRAL														
Arkansas	4	---	20	1	2	14	24	---	9	---	1	---	21	4
Louisiana	8	---	1	3	1	13	3	---	2	---	1	3	2	---
Oklahoma	7	---	51	4	---	10	43	1	5	---	---	1	---	2
Texas	19	1	831	32	6	242	52	---	21	---	---	8	66	7
MOUNTAIN														
Montana	5	---	5	18	---	---	1	---	2	---	---	1	---	---
Idaho	2	1	1	1	---	6	20	---	d 9	---	---	1	1	---
Wyoming	---	---	---	3	---	3	4	---	---	---	---	---	2	---
Colorado	1	3	6	2	---	15	23	---	6	---	---	2	6	---
New Mexico	2	---	---	10	---	8	13	---	4	---	---	3	2	---
Arizona	---	---	38	12	---	2	8	---	2	---	---	---	10	---
Utah [a]	1	---	3	16	---	---	12	---	---	---	---	---	13	---
Nevada	---	---	---	---	---	---	2	---	---	---	---	---	---	---
PACIFIC														
Washington	---	---	4	118	---	2	24	---	16	---	---	2	10	---
Oregon	4	---	9	18	---	23	23	1	2	---	---	---	17	---
California	5	1	5	38	1	31	110	---	d 42	---	---	20	95	---
Total	228	18	1,163	611	38	999	1,586	4	733	1	2	108	1,520	---
Median, 1944–48	351	16	1,171	737	66	---	877	6	1,019	1	13	102	1,589	---
Year to date 40 weeks	5,495	[1] 613	82,857	591,045	2,656	61,699	[2] 34,736	535	61,423	44	920	3,020	48,122	---
Median, 1944–48	8,838	506	197,065	555,310	4,865	---	15,423	501	91,923	286	734	3,297	77,461	---
Seasonal low week ends	(27th) July 9	---	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17		(11th) Mar. 19	---	(32nd) Aug. 13	(35th) Sept. 3	---	(11th) Mar. 19	(39th) Oct. 1	---
Since seasonal low week	1,727	---	6,990	2,527	140	---	[2] 33,820	---	3,163	3	---	2,560	1,520	---
Median, 1944–45 to 1948–49 [b]	3,122	---	6,868	2,915	199	---	15,160	---	5,628	13	---	2,822	1,589	---

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods (1944–45 to 1948–49).
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately as follows: North Dakota 1, Maryland 2, Virginia 2, Louisiana 1, Texas 1, Colorado 1, Washington 2, California 21. Cases reported as Salmonella infection, not included in the table, were as follows: Massachusetts 13, New York 1.
[1] Encephalitis: Delayed reports, North Dakota 18 cases.
[2] Poliomyelitis: Delayed reports, Maryland, August onset 3 cases, September onset 9 cases; deductions, Michigan, weeks ended Aug. 13, 1 case, September 3, 2 cases.

Alaska: Influenza 1, measles 67, septic sore throat 4, tularemia 1.
Hawaii Territory: Influenza 3, measles 2, pneumonia 1.

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—5 weeks ended October 1, 1949.—During the 5 weeks ended October 1, 1949, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	22	Syphilis	46
Diphtheria	38	Tetanus	18
Dysentery	5	Tetanus, infantile	1
Gonorrhea	103	Tuberculosis (all forms)	456
Influenza	11,550	Typhoid fever	5
Malaria	10	Typhus fever (murine)	5
Measles	19	Whooping cough	152
Poliomyelitis	10		

DEATHS DURING WEEK ENDED OCT. 8, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Oct. 8, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,071	8,422
Median for 3 prior years	8,630	
Total deaths, first 40 weeks of year	366,876	368,429
Deaths under 1 year of age	646	601
Median for 3 prior years	706	
Deaths under 1 year of age, first 40 weeks of year	26,183	26,734
Data from industrial insurance companies:		
Policies in force	70,086,323	70,838,415
Number of death claims	11,529	11,513
Death claims for 1,000 policies in force, annual rate	8.6	8.5
Death claims per 1,000 policies, first 40 weeks of year, annual rate	9.2	9.4

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended September 17, 1949.—During the week ended September 17, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	New-foundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			15		28	25	1	9	12	25	115
Diphtheria					7	1					8
Dysentery, bacillary						4					4
Encephalitis, infectious							4				4
German measles					1	5	1	1	8	1	17
Influenza			14							1	15
Measles			4		52	22	15	12	13	24	142
Mumps			7		6	34	2	1	1	29	80
Poliomyelitis	4		10	5	30	67	17	4	17	13	167
Scarlet fever			3	1	28	12	2	1	10	1	58
Tuberculosis (all forms)			6	8	127	39	40	20	32	41	316
Typhoid and paratyphoid fever					35	5	1			7	48
Undulant fever			1		1		1				3
Venereal diseases:											
Gonorrhea	8	5	13	7	96	62	33	11	39	64	338
Syphilis	3	1	14	8	76	22	5	11	9	13	162
Other forms										2	2
Whooping cough	2				91	45	1	5	5	10	159

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-July 1949	August 1949	September 1949—week ended—			
			3	10	17	24
ASIA						
Burma	240	1				
Bassein	183					
Moulmein	2					
Rangoon	2	[1] 1				
Ceylon:						
Trincomalee	2					
China:						
Amoy	[2] 1					

See footnotes at end of table.

CHOLERA—Continued

Place	January–July 1949	August 1949	September 1949—week ended— 3	10	17	24
ASIA—Continued						
India	62,160	8,376	[3] 1,642	[3] 1,359	[3] 1,023	
Ahmedabad			1			
Allahabad	5	7		1		
Bombay	[1] 5	[1] 1				
Calcutta	[4] 1,511	195	44	52	44	39
Cawnpore	128	45	5	4	4	2
Cocanada		5	6	1		
Cuddalore	2					
Lucknow	32		[1] 1			
Madras	198	150	16	44	15	6
Masulipatam	1					
Nagpur	1	17	4	2		
Negapatam	26					
New Delhi	[4] 2	16		1		
Raj Samand	(5)					
Tuticorin	11					
India (French):						
Karikal	55					
Pondicherry	100					
Indochina (French):						
Cambodia	42	3				
Cochinchina	10	1				
Pakistan	22,968	[3] 769				
Chittagong	74	1				
Dacca	92	6				
Lahore	11	4		9		
Siam (Thailand)	9					
Bangkok	8					

[1] Imported. [2] Suspected. [3] Preliminary figures. [4] Includes imported cases. [5] Correction: The 40 cases of cholera reported in Raj Samand for the period January–June 1949 (see Pub. Health Rep. 64: 1242 (1949, were in error. No cases of cholera were reported in Raj Samand during that period.

PLAGUE

(Cases)

AFRICA						
Basutoland	42					
Belgian Congo	12	2	1			
Costermansville Province	2	1				
Stanleyville Province	[1] 10	1	1			
British East Africa:						
Kenya	5					
Tanganyika	15					
Madagascar	70	4		[2] 15	[2] 1	
Tananarive	3	4				
Rhodesia, Northern	2					
Union of South Africa	[4,5] 54	[4] 10	3	[6] 3	[4,6] 5	2
Cape Province	[4] 23	[4] 8	1	[6] 3	[4,6] 5	2
Orange Free State	[4] 8		2			
Transvaal	4					
ASIA						
Burma	[7] 426	4	1			
Mandalay	1					
Moulmein	[7] 6					
Rangoon	[7] 7	[8] 1				
China:						
Chekiang Province	7					
Wenchow	7					
Fukien Province	20					
Kiangsi Province	9					
India	[7] 25,459	1,064	[9] 272	[9] 90	[9] 84	
Indochina (French)	117	6	2		1	
Annam	63	3			1	
Cambodia	20	2	2			
Cochinchina	[10] 31	1				
Laos	3					
Java	[11] 62	[12] 30	[12] 18	[12] 27	[12] 4	[12] 3
Siam (Thailand)	152	3	5	2	4	

See footnotes at end of table.

PLAGUE—Continued

Place	January–July 1949	August 1949	September 1949—week ended— 3	10	17	24
EUROPE						
Portugal: Azores	4					
SOUTH AMERICA						
Ecuador:						
Loja Province		[14] 4				
Peru:						
Lambayeque Department	10					
Lima Department	4					
Piura Department	7					
Venezuela:						
Aragua State	2					
OCEANIA						
Hawaii Territory: Plague infected rats [15]						

[1] Includes 2 cases of pneumonic plague. [2] Sept. 1–10, 1949. [3] Sept. 11–20, 1949. [4] Includes suspected cases. [5] Corrected figure. [6] Pneumonic plague. [7] Includes imported cases. [8] Imported. [9] Preliminary figures. [10] Includes 7 cases of pneumonic plague, reported in April 1949. [11] Includes 29 cases (all fatal) reported in Jogjakarta Residency July 10–August 7, 1949. [12] In Jogjakarta Residency, all fatal. [13] In Jogjakarta City. [14] Chaguarpamba, Paltas County, 2 cases; Sozoranga, Macara County, 1 case; Cola, Celica County, 1 case. [15] Plague infection has been reported in Hawaii Territory as follows: On Mar. 12, 1949, in mass inoculation of 2 pools of tissue from 10 rats (8 and 2), taken on Maui Island; on Mar. 16, 1949, in mass inoculation of 3 pools of 29 fleas (7, 12, and 10); on Aug. 4, 1949, in mass inoculation of 15 fleas; on Aug. 18, 1949, in a pool of 31 fleas, and on Sept. 15, 1949, in 49 fleas, all collected from rats trapped on the Island of Hawaii.

SMALLPOX

(Cases)

(P=present)

AFRICA						
Algeria	160	21		[1] 7		
Angola	[2] 560					
Belgian Congo	[3] 1,317	149	54			
British East Africa:						
Kenya	24	1				
Nyasaland	976	35				
Tanganyika	564			1	1	
Uganda	36					
Cameroon (British)	20					
Cameroon (French)	64			[1] 4		
Dahomey	297	53		[1] 13	[3] 11	
Egypt	3					
Eritrea	1					
Ethiopia	6					
French Equatorial Africa	87	88				
French Guinea	1					
French West Africa: Haute Volta	120	1				
Gambia	58					
Gold Coast	17					
Ivory Coast	251	3			[3] 1	
Liberia	3					
Morocco (French)	8					
Mozambique	171	24				
Nigeria	7,442					
Niger Territory	421	41		[1] 2		
Portuguese Guinea	1					
Rhodesia:						
Northern	5	1		[1] 1	[3] 2	
Southern	406					
Senegal	16					
Sierra Leone	108					
Sudan (Anglo-Egyptian)	160	36		6		6
Sudan (French)	154	1		[1] 2		
Togo (French)	132				[3] 3	
Tunisia		1				
Union of South Africa	455	P	P	P	P	P

See footnotes at end of table.

SMALLPOX—Continued

Place	January-July 1949	August 1949	September 1949—week ended—			
			3	10	17	24
ASIA						
Afghanistan	144	49				
Arabia	[4] 42	3				
Bahrein Islands	[4] 54	1		1	1	1
Burma	1,544	61	9	7	14	16
Ceylon	[5] 1	[5] 1				
China	947					
India	59,015	2,183	[6] 473	[6] 251	[6] 231	
India (French): Yanaon	1					
India (Portuguese)	216	6				
Indochina (French)	2,359	15	1	1	6	
Iran	249	37	4			
Iraq	[4] 408	19	2	2	25	19
Israel	5					
Japan	122					
Korea (Southern)	8,767					
Lebanon	[4] 139					
Malay States (Federated)	43					
Manchuria	9					
Netherlands Indies:						
Java	[4] 7,127	2,414	407	246	280	207
Riouw Archipelago	2					
Sumatra	[4] 136	38	8	5	2	5
Pakistan	3,473	[6] 60				
Philippine Islands:						
Mindoro Island	11					
Romblon Island	[5] 4					
Tablas Island	2					
Portuguese Timor	4					
Siam (Thailand)	37	8			1	
Straits Settlements: Singapore	[4] 2					
Syria	427	66		7	5	1
Transjordan	193	[6] 2				
Turkey. (See Turkey in Europe.)						
EUROPE						
Belgium	1					
Germany (U. S. Zone)	[7] 1					
Great Britain: England and Wales	[4] 20					
Italy	[8] 95					
Portugal	7					
Spain	2					
Canary Islands	6					
Turkey	92					
NORTH AMERICA						
Cuba: Habana	[4] 6					
Guatemala	4					
Mexico	[2] 45	1	1		1	
SOUTH AMERICA						
Argentina	[2] 100	[2] 55		11	17	
Bolivia	35					
Brazil	[2] 79	[9] 14	1		4	
Chile	[5] 2					
Colombia	[2] 1,835					
Equador	[4] 544	22				
Paraguay	[2] 4	2				
Peru	1,646					
Venezuela	1,328					
OCEANIA						
Guam	2					

[1] Sept. 1–10, 1949. [2] Includes alastrim. [3] Sept. 11–20, 1949. [4] Includes imported cases. [5] Imported. [6] Preliminary figures. [7] Reported week ended July 30, 1949, in Wurtemburg. [8] Includes 95 cases of varioloid reported in Rome Jan. 1–June 10, 1949. [9] Alastrim.

TYPHUS FEVER*

(Cases)

(P=present)

Place	January–July 1949	August 1949	September 1949—week ended—			
			3	10	17	24
AFRICA						
Algeria	59	5		[1] 1		
Basutoland	24					
Belgian Congo	[2] 41					
British East Africa:						
Kenya	76					
Nyasaland	4					
Tanganyika	1					
Egypt	174	2				
Eritrea	62	1		1		
Ethiopia	457					
Gold Coast	1					
Libya	198	10				
Madagascar: Tananarive	[2] 10					
Morocco (French)	16					
Morocco (Spanish)	22					
Sierra Leone	[2] 1					
Tunisia	61	3		[1] 4		
Union of South Africa	[3] 72	[2] 3		P	P	
ASIA						
Afghanistan	[4] 1,548	14				
Arabia: Aden	[5] 2					
Burma	4					
Ceylon: Colombo	[2] 5					
China	44	4				
India	[5] 230	2		1		
India (Portuguese)	20	5				
Indochina (French)	13	1				
Iran	156	3				
Iraq	41	11	4	3	2	4
Japan	92		1			
Korea	1,140	7				
Lebanon	1	1				
Pakistan	590					
Palestine	[6] 100					
Philippine Islands: Manila	[2] 1					
Straits Settlements: Singapore	[7] 2					
Syria	21	1				1
Transjordan	59	1				
Turkey. (See Turkey in Europe.)						
EUROPE						
Belgium	[5] 5					
Bulgaria	371	13	4			
Czechoslovakia	20			2		
France	4	1				
Great Britain: Island of Malta	5	1	2	1	2	
Greece	[3] 33	[3] 23	1	1		
Hungary	20					
Italy	29	4				
Sicily	13					
Poland	243	9				
Portugal	5					
Rumania	417					
Spain	3	2				
Turkey	136	13	4	4	6	
Yugoslavia	159	16		2		
NORTH AMERICA						
Bahama Islands: Nassau	[2] 1					
Costa Rica [2]	24	4	1			
Cuba [2]	3					
Guatemala	37					
Jamaica [2]	16	1	1			
Mexico [3]	134	29	2		2	
Panama Canal Zone [2]	10					
Puerto Rico [2]	27		1		2	1

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January–July 1949	August 1949	September 1949—week ended—			
			3	10	17	24
SOUTH AMERICA						
Argentina [2]	1					
Bolivia	53					
Brazil	2					
Chile [3]	140	12		2		
Colombia [3]	1,667					
Curacao [2]	5					
Ecuador [3]	213					
Peru	663					
Venezuela [2]	62	5	1	1		1
OCEANIA						D
Australia [2]	[8] 78	9	1			
Hawaii Territory [2]	7	1				

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.
[1] Sept. 1–10, 1949. [2] Murine type. [3] Includes murine type. [4] An epidemic of louse-borne typhus fever was reported in Afghanistan on July 22, 1949. [5] Includes imported cases. [6] Approximate number reported in outbreak in villages in Hebron and Bethlehem districts in February 1949. [7] One case type unspecified, 1 case murine type. [8] Corrected figure.

YELLOW FEVER

(C=cases; D=deaths)

Place		January–July 1949	August 1949	Sept. 3	Sept. 10	Sept. 17	Sept. 24
AFRICA							
Belgian Congo:							
Stanleyville Province	D	5					
French Equatorial Africa:							
Bangui	D		1				
Gold Coast	C	[1] 14	[1] 8				
Akwatia	C	4	[2] 1				
Birim District	C	[1] 3					
Komenda Village [3]	D	1					
Nkwanta Dunkwa Area	D	1					
Oda Area:							
Bawdua	C	[2] 1	[2] 1				
Esuboni	C	[2] 1	[2] 1				
Oseikrome Village	D	1					
Winneba Area:							
Apam	D		1				
Akukuom	D		1				
Nyakrom	C	[4] 2	[5] 3				
Nigeria:							
Kaduna (Airport)	D					1	
Lagos	D	[6] 2					
Sudan (French):							
Bamaku	D					1	
NORTH AMERICA							
Panama:							
Colon Province	D		2		[7] 1		
Pacora	C	[8] 8					
SOUTH AMERICA							
Brazil:							
Amazonas State	D	1					
Para State	D	3					
Ecuador:							
Napo Pastaza Province	D	1					
Peru:							
Cuzco Department	D	2					
San Martin Department	D	1					

[1] Includes suspected cases. [2] Suspected. [3] Near seaport of Sekondi. [4] Deaths. [5] Includes 2 deaths (1 confirmed, 1 suspected) and 1 suspected case. [6] Imported. [7] Reported in Buena Vista. [8] Reported Jan. 15, 1949. Date of occurrence Nov. 11–Dec. 30, 1948. Five cases (all fatal) confirmed, 3 suspected cases.

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

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U. S GOVERNMENT PRINTING OFFICE. 1949

Public Health Reports

OLUME 64 **NOVEMBER 4, 1949** NUMBER 44

TUBERCULOSIS CONTROL ISSUE NO. 45

IN THIS ISSUE

Development of Calcification
in Pulmonary Lesions
Associated With Sensitivity to Histoplasmin

FEDERAL SECURITY AGENCY

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CONTENTS

Page

Development of calcification in pulmonary lesions associated with sensitivity to histoplasmin. Michael L. Furcolow ---------- 1363

INCIDENCE OF DISEASE

United States:
- Reports from States for week ended October 15, 1949 ---------- 1394
- Communicable disease charts ---------- 1395
- Territories and possessions:
  - Hawaii Territory—Plague (rodent) ---------- 1398
  - Panama Canal Zone—Notifiable diseases—August 1949 ---------- 1398
- Deaths during week ended October 15, 1949 ---------- 1398

Foreign reports:
- Canada—Provinces—Notifiable diseases—Week ended September 24, 1949 ---------- 1399
- Cuba—
  - Habana—Notifiable diseases—5 weeks ended July 30, 1949 ---------- 1399
  - Provinces—Notifiable diseases—5 weeks ended July 30, 1949 ---------- 1399
- Finland—Notifiable diseases—August 1949 ----------
- Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—
  - Plague ---------- 1400
  - Smallpox ---------- 1401
  - Typhus fever ---------- 1401
  - Yellow fever ---------- 1401

Public Health Reports

Vol. 64 • NOVEMBER 4, 1949 • *No. 44*

Development of Calcification in Pulmonary Lesions Associated with Sensitivity to Histoplasmin

By Michael L. Furcolow, M. D.*

As a result of intensive studies during the past few years, evidence has accumulated which suggests that histoplasmosis—formerly believed to be a rare and usually fatal disease—also exists as a mild asymptomatic syndrome which is very prevalent in certain parts of the world (*1, 2*). Although quite typical cases of clinical histoplasmosis are probably much more frequent than previously thought, the principal significance of the asymptomatic form is that in certain respects the disease so closely resembles tuberculosis as to be frequently confused with it.

The most striking similarity between the two diseases lies in the fact that in both there are pulmonary calcifications which are so alike in appearance as to be indistinguishable except that some occur in people who are hypersensitive to tuberculin and others in people hypersensitive to histoplasmin (*3*). With respect to tuberculosis, it has been well established that the antecedent lesion is a "soft" type of infiltrate in a tuberculin positive individual from whom it is often possible to recover tubercle bacilli by careful examination. Rather similar soft lesions have been found in histoplasmin positive, tuberculin negative persons, and the fungus *Histoplasma capsulatum* has been recovered in some of these cases. Although this type of evidence leaves little doubt that healing by calcification does take place in histoplasmosis as it does in tuberculosis, the actual demonstration of calcification developing in pulmonary infiltrates in histoplasmin positive individuals has not yet been presented convincingly.

By doing periodic routine school X-ray and skin testing surveys in Kansas City, several hundred histoplasmin positive, tuberculin negative children with pulmonary infiltrates were found, the different types of lesions having been described in an earlier paper by Furcolow,

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This is the forty-fifth of a series of special issues of Public Health Reports devoted exclusively to tuberculosis control, which appear in the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the Public Health Reports. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

Mantz and Lewis (*4*). These children have now been followed for varying periods up to 4 years, during which time some of the infiltrates disappeared completely, some apparently became fibrotic, but the majority gradually developed calcification.

Seventeen children whose lesions calcified have been selected for presentation in this paper. The group includes 9 white males, 6 white females, 1 colored male and 1 colored female, ranging in age from 4 to 15 years. Most of these children had lived all of their lives in or near Kansas City. All of the children were completely asymptomatic at the time of the survey and throughout the period of observation, with no history of any type of illness which could be related to the development of the infiltrate. Two patients (cases 1 and 2) with respiratory symptoms were referred for diagnosis and have been added to the series obtained from the survey.

In addition to skin tests and chest films at regular intervals on all cases, the periodic observation included serological studies and search for the etiological agent. Because all but two of the children appeared to be in normal good health during the follow-up period, it was difficult to obtain permission for some of the most desirable examinations. Therefore, although the results of such tests are included in the case summaries, coverage of the total group is too inadequate to permit discussion.

Repeated skin testing throughout the period of observation, using the same antigens, dosages and techniques described previously (*5*), showed that all of the children remained sensitive to histoplasmin and negative to tuberculin.

In the entire original group of several hundred children with infiltrates which has been studied, there was no evidence of new lesions appearing, nor was there progression of the initial lesion. One possible exception, illustrated in case 17, shows a contralateral infiltration which, because it completely disappeared within 3 weeks, was most probably a virus or nonspecific type of pneumonia.

In the following pages, two films are reproduced from the series for each of the 17 children, the earlier film showing the lesion and the later calcification. Twenty-one enlargements of the lesions under study are also included to give a better picture of the developing calcification. In general the precalcific lesions may be classified as disseminated infiltrates, pneumonic infiltrations or nodular foci, although in some cases the classification is difficult as the lesion appears to be intermediate between two of the groups.

The disseminated infiltrates consist of multiple lesions scattered throughout both lung fields. The individual infiltrates may be uniformly millet-seed in size or may range from a few millimeters in diameter to large conglomerate patchy areas (figs. 1, 3, 7). In some of the infiltrates (fig. 5) a central core of calcification may be seen.

Marked enlargement of the hilar nodes is frequently associated with this type of disease, as demonstrated in three of the four cases included in this group. Calcifications resulting from disseminated infiltrates are distributed throughout the parenchyma with variation in size and shape corresponding to the distribution and extent of the infiltrates. In the miliary type of lesions, the calcifications are small, fairly round and equally distributed throughout the lung fields, presenting a picture once thought to represent healed miliary tuberculosis.

Pneumonic infiltration usually consists of a small area of infiltration, poorly circumscribed and irregular in shape (figs. 21, 49), although in one case there is a rather diffuse type of pneumonitis (fig. 9). Development of calcification may appear in the infiltrates as scattered small foci throughout the lesion (figs. 23, 24, 51, 52) or as a single lesion in the midst of a clearing area (fig. 10).

Nodular lesions are demonstrated in 8 of the 17 cases presented. These lesions consist of well-defined, nodular shadows ranging in size from ½ to 4 centimeters in diameter (figs. 13, 17, 33, 37, 41). A calcified central core developing in the nodule is a characteristic finding (figs. 19, 39, 53) although in many cases the calcification appears to replace the entire lesion (figs. 15, 19) or develops in multiple small areas within the infiltrate (figs. 27, 35, 43).

Hilar adenopathy is marked in more than half of the cases illustrated. Raspberry-like calcification may be seen developing gradually throughout some of the nodes and in others there is a fairly homogeneous deposition of the calcium salts. Figure 29 shows a case of unilateral enlarged hilar nodes without any parenchymal lesion; figure 47 shows an enormous calcified node in the lower right hilum.

Brief case summaries are presented with each series of films giving pertinent data for the individual case. Since all of the children were tuberculin negative and histoplasmin positive throughout the observation period, this information is omitted in the legends accompanying the figures.

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(*1*) Palmer, C. E.: Nontuberculous pulmonary calcification and sensitivity to histoplasmin. Pub. Health Rep. **60:** 513–520 (1945).

(*2*) Christie, Amos, and Peterson, J. C.: Pulmonary calcification in negative reactors to tuberculin. Am. J. Pub. Health **35:** 1131–1147 (1945).

(*3*) Edwards, Lydia, Lewis, Ira, and Palmer, C. E.: Studies of pulmonary findings and antigen sensitivity among student nurses. Pub. Health Rep. **63:** 1569–1591 (1948).

(*4*) Furcolow, M. L., Mantz, H. L., and Lewis, Ira: The roentgenographic appearance of persistent pulmonary infiltrates associated with sensitivity to histoplasmin. Pub. Health Rep. **62:** 1711–1718 (1947).

(*5*) Furcolow, M. L., High, R. H., and Allen, M. F.: Some epidemiological aspects of sensitivity to histoplasmin and tuberculin. Pub. Health Rep. **61:** 1132–1144 (1946).

(*6*) Bunnell, I. L., and Furcolow, M. L.: A report on ten proved cases of histoplasmosis. Pub. Health Rep. **63:** 299–316 (1948).

Figure 1. Case 1, 9-3-46, white male, age 4. Miliary lesions in a proved case of histoplasmosis

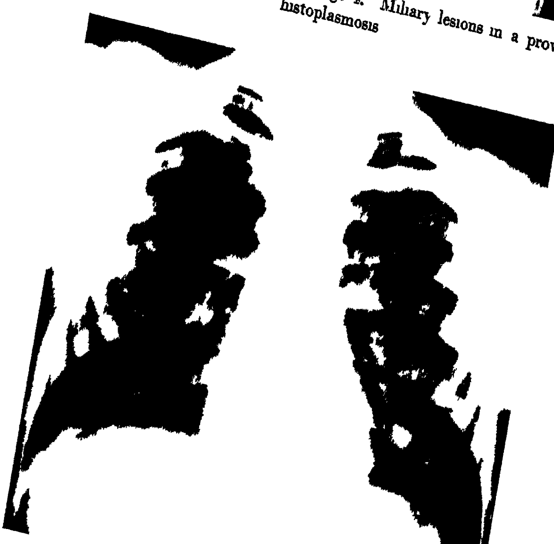


Figure 2. Same case as above, 4-29-49 *H capsulatum* recovered by culture from tonsils January 1948 10 gastric and 1 bone marrow culture negative for fungi. 5 gastrics negative by culture and hamster inoculation for tuberculosis 5 complement fixation tests for histoplasmosis positive (1947-1949).

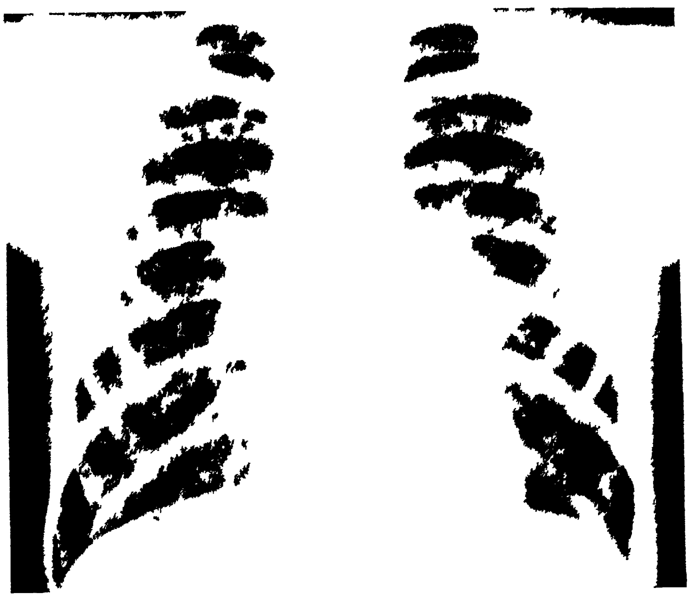


Figure 3. Case 2, 4–10–45, white male, age 13. Miliary lesions in a proved case of histoplasmosis (*6*).

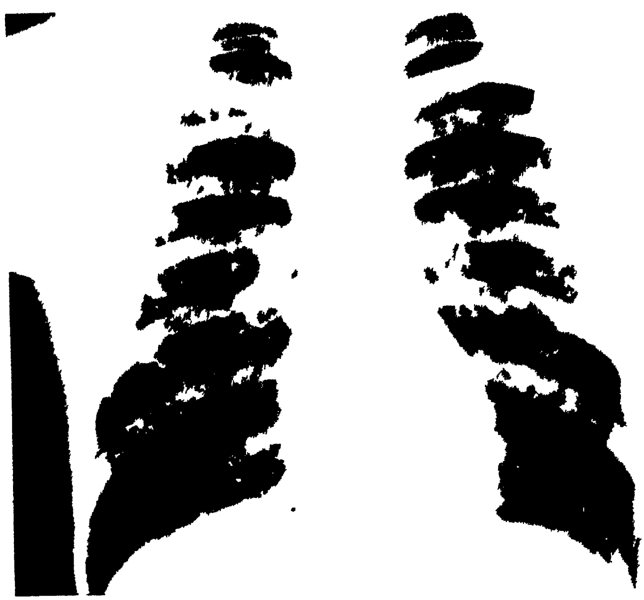


Figure 4. Same case as above, 6–22–49. Cultures of gastric aspiration positive for *H. capsulatum*. 8 complement fixation tests for histoplasmosis; 2 were positive, 3 suspicious, and 3 negative.

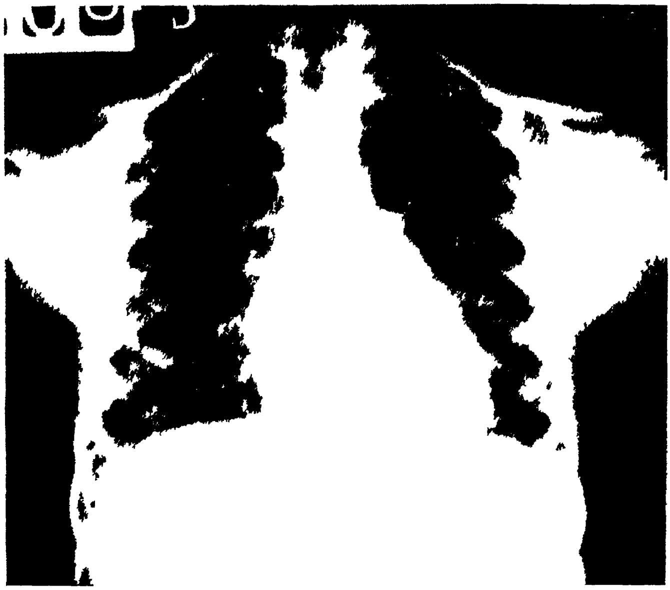


Figure 5. Case 3, 11–29–45, white female, age 6. Miliary lesions.

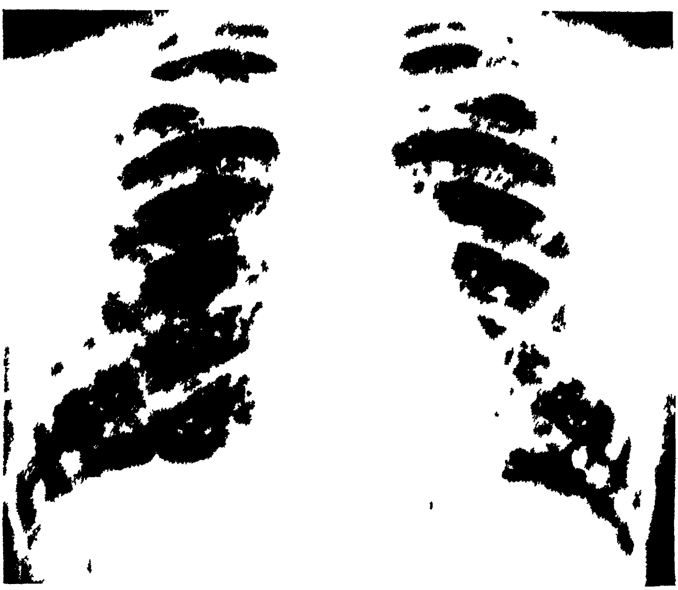


Figure 6. Same case as above, 7–11–49. 3 gastrics negative for tuberculosis and fungi. Blood culture negative. Complement fixation tests suspicious (1947), negative (1949).

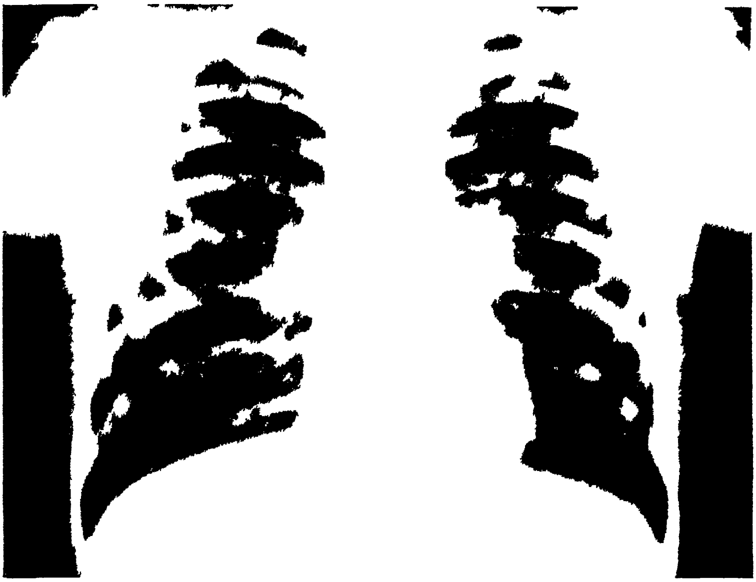


Figure 7. Case 4, 1-2-17, white male, age 8. Miliary lesions.

Figure 8. Same case as above, 4-13-49. 2 gastrics, skin biopsy, blood and bone marrow cultures negative for tuberculosis and fungi. Lymph node biopsy showed granulation tissue. 2 negative complement fixation tests for histoplasmosis (1947-1949).

Figure 9. Case 5, 10–12–46, white male, age 13. Diffuse pneumonic lesions with enlarged nodes.

Figure 10. Same case as above, 3–10–49. Sputum and 3 gastrics negative for tuberculosis by culture and hamster inoculation. Bronchoscopy, 6 gastrics, bone marrow and lung puncture negative for fungi. 5 complement fixation tests for histoplasmosis: 1 positive, 2 suspicious, 2 negative.

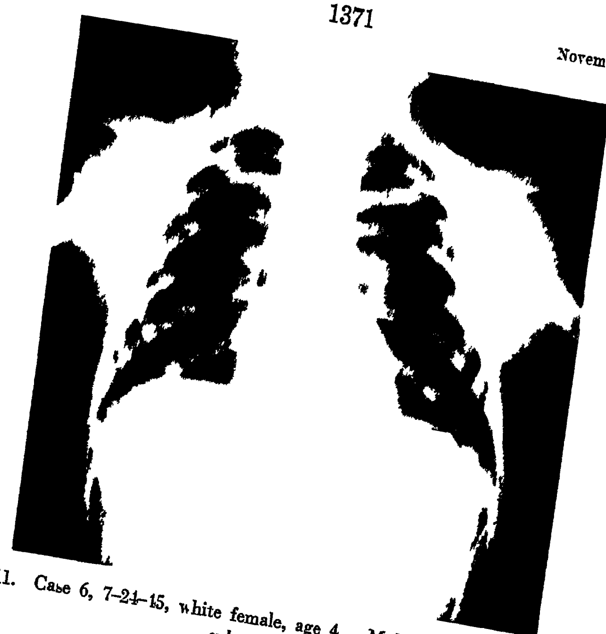


Figure 11. Case 6, 7-24-45, white female, age 4. Multiple nodular lesions with enlarged nodes.

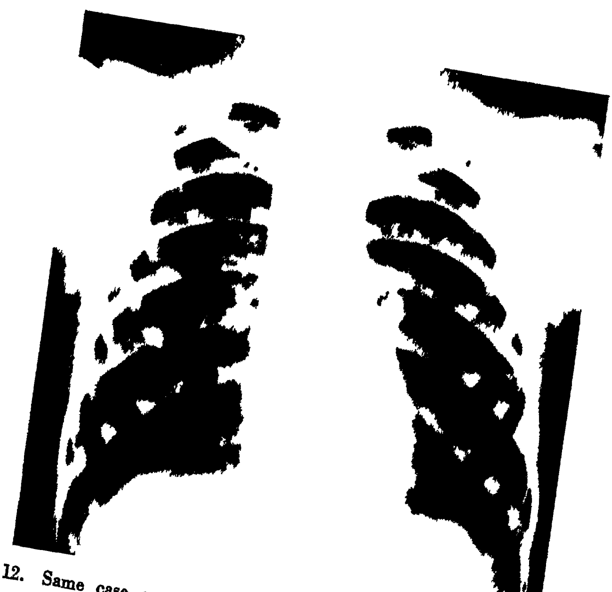


Figure 12. Same case as above, 2-3-49. No cultural studies. 3 complement fixation tests for histoplasmosis: 1 suspicious and 2 negative.

Figure 13. Case 7, 10–26–45, colored male, age 15. Nodular lesion right fourth inter space with enlarged nodes.

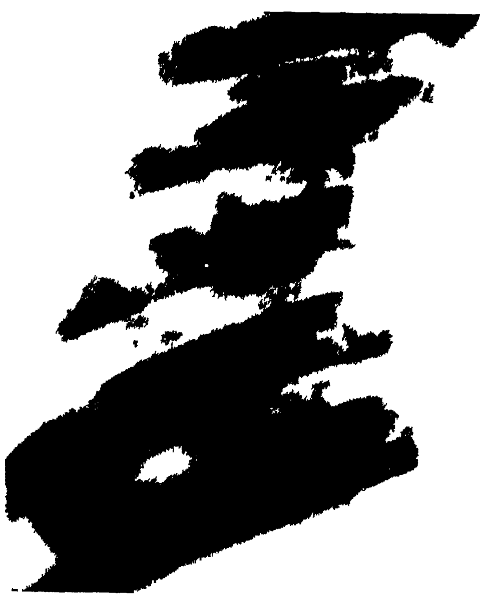


Figure 14. Same film as above. Lesion 2/3 actual size.

Figure 15. Case 7, 7-11-49.

Figure 16. Same film as above. Lesion 2/3 actual size. No cultural studies. Complement fixation tests for histoplasmosis positive twice (1948, 1949).

Figure 17 Case 8, 3–20–46, white female, age 12 Nodular lesion right third inter-space with enlarged nodes.

Figure 18. Same film as above. Lesion ⅔ actual size.

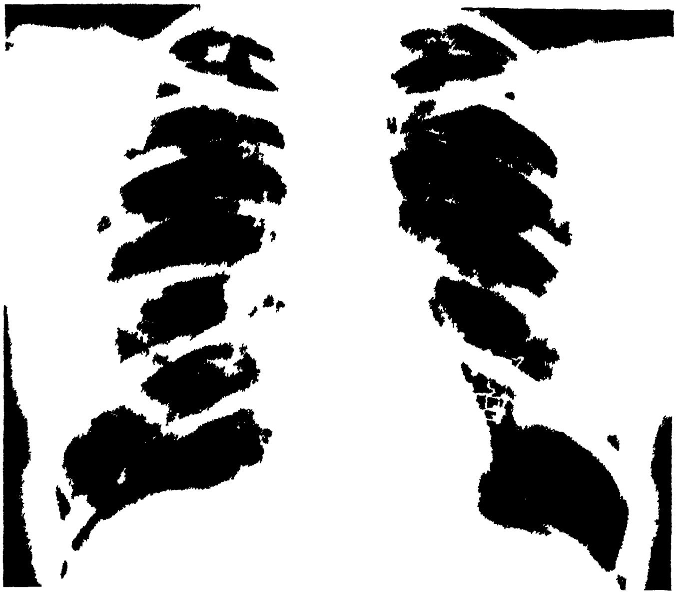


Figure 19 Case 8, 2–2–49.

Figure 20 Same film as above Lesion ⅞ actual size No cultural studies. 5 complement fixation tests for histoplasmosis 2 suspicious and 3 negative.

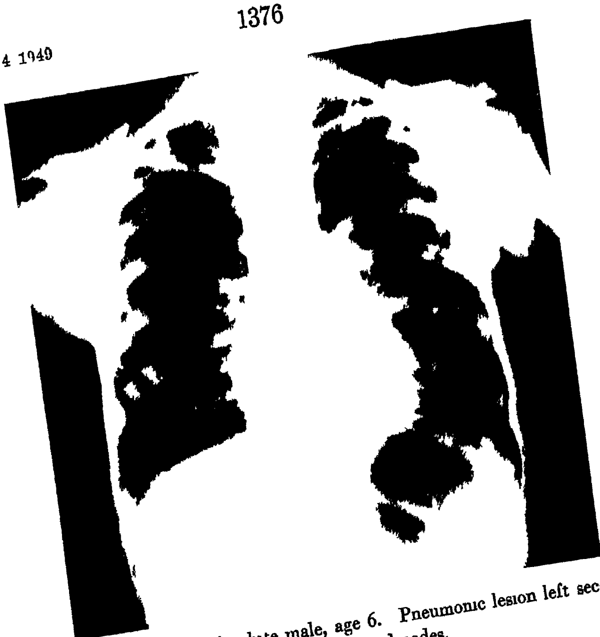


Figure 21. Case 9, 1-7-46, white male, age 6. Pneumonic lesion left second interspace with enlarged nodes.

Figure 22. Same film as above. Lesion ⅔ actual size.

Figure 23 Case 9, 3–24–49

Figure 24 Same film as above Lesion ⅞ actual size No cultural studies. 7 complement fixation tests 1 positive, 4 suspicious, 2 negative

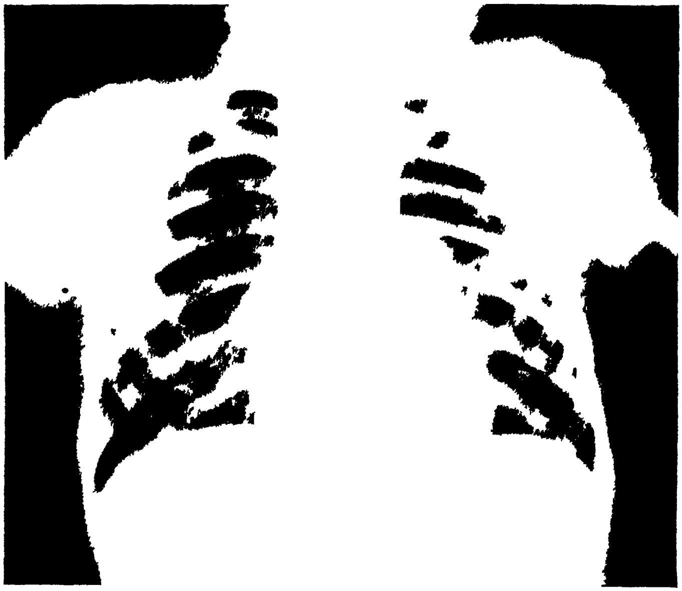


Figure 25. Case 10, 3–9–45, white male, age 6. Nodular lesion left third interspace with enlarged nodes

Figure 26. Same film as above. Lesion ⅔ actual size

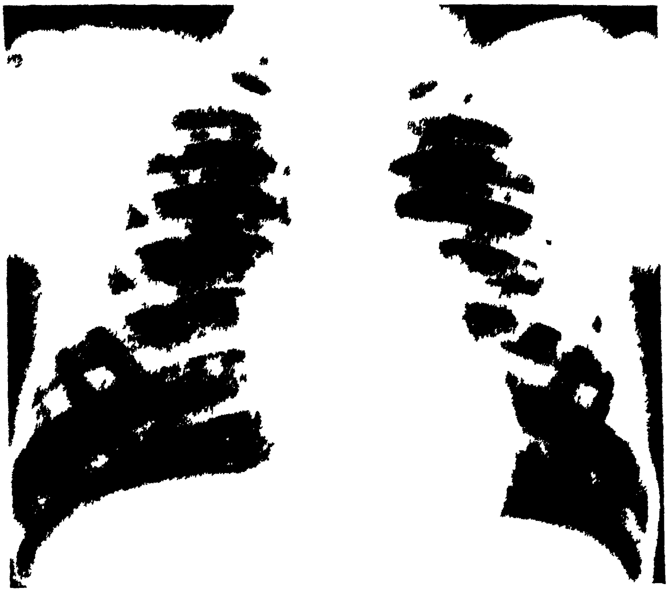


Figure 27 Case 10, 6–2–49.

Figure 28 Same film as above Lesion 7/8 actual size No cultural studies Complement fixation test negative, July 1949

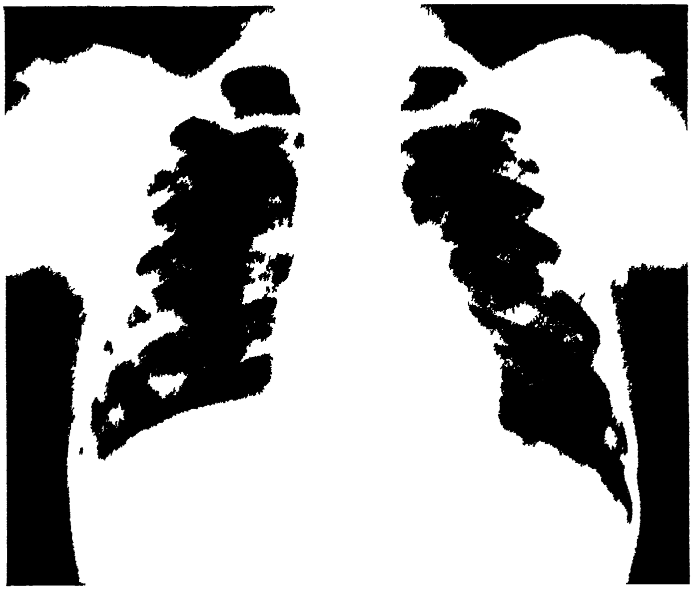


Figure 29. Case 11, 12–6–45, white male, age 10. Enlarged right hilar and mediastinal nodes.

Figure 30. Same film as above. Lesion ⅔ actual size.

Figure 31 Case 11, 2–16–49

Figure 32 Same film as above Lesion ⅔ actual size No cultural studies 2 complement fixation tests negative, 1948 and 1949

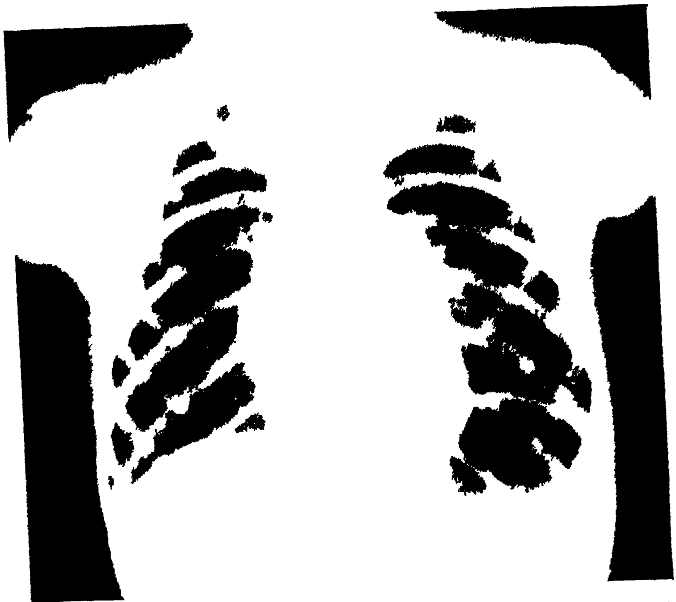


Figure 33. Case 12, 3-2-45, white male, age 7. Nodular lesion left fifth interspace with enlarged nodes.

Figure 34. Same film as above. Lesion ⅔ actual size.

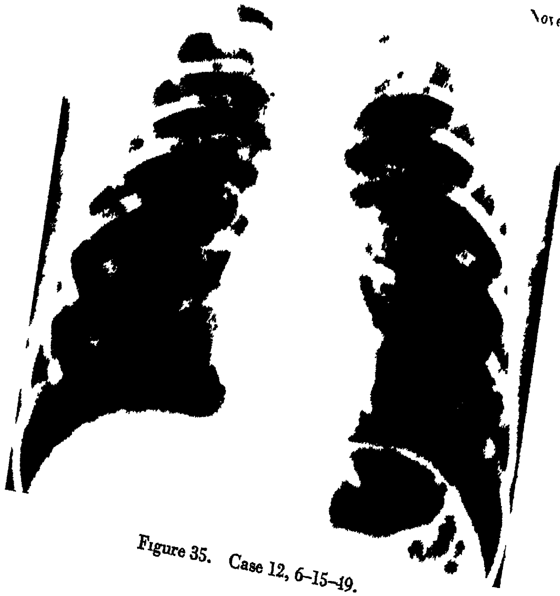


Figure 35. Case 12, 6-15-49.

Figure 36. Same film as above Lesion ⅔ actual size No cultural studies. 5 complement fixation tests for histoplasmosis: 1 suspicious and 4 negative.

Figure 37. Case 13, 10–23–45, white male, age 10. Nodular lesion right third interspace with enlarged nodes.

Figure 38. Same film as above. Lesion ⅔ actual size.

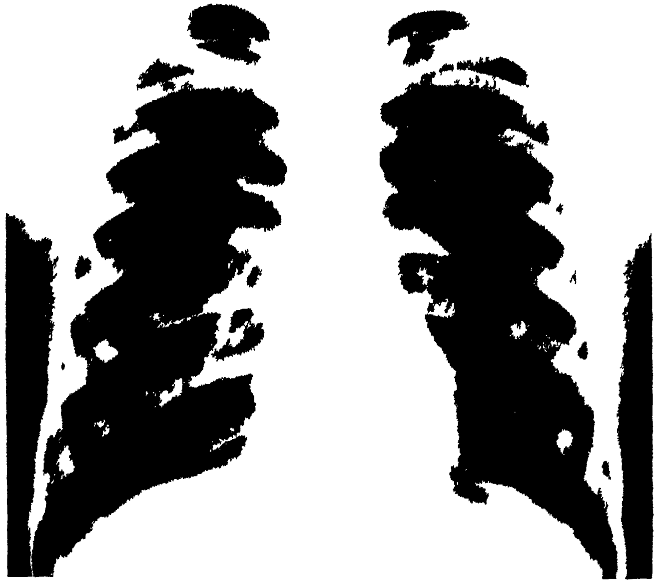


Figure 39. Case 13, 6–14–49.

Figure 40. Same film as above. Lesion ⅔ actual size. No cultural studies. Complement fixation test for histoplasmosis negative, 1947.

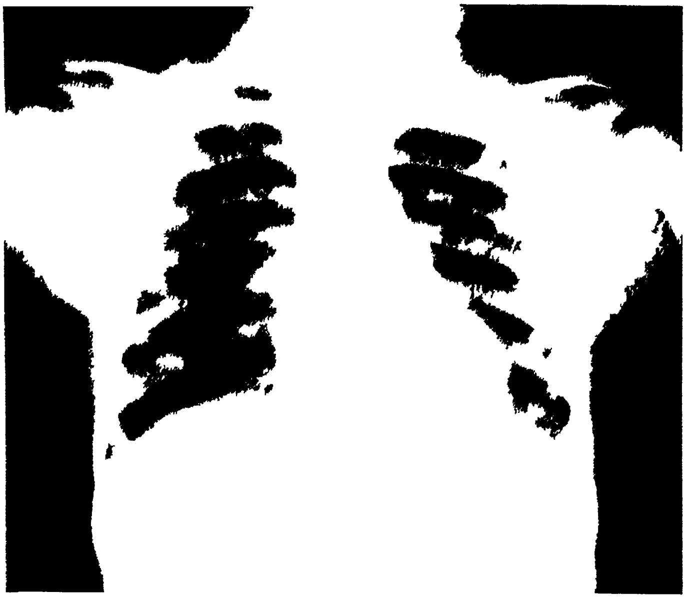


Figure 41. Case 14, 10–4–45, colored female, age 5 Nodular lesion right fifth interspace with enlarged nodes.

Figure 42. Same film as above. Lesion 2/3 actual size

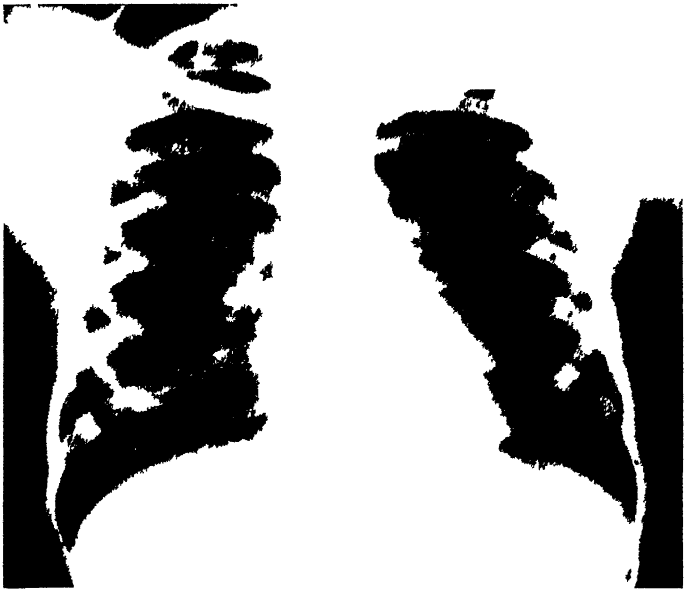


Figure 13. Case 14, 11–16–18.

Figure 44. Same film as above. Lesion ⅔ actual size. No cultural studies. 2 negative complement fixation tests, 1948.

Figure 45. Case 15, 10–22–45, white female, age 11. Nodular lesion right fifth interspace with enlarged nodes.

Figure 46. Same film as above. Lesion ⅔ actual size.

Figure 47. Case 15, 3-15-19.

Figure 48. Same film as above. Lesion ⅔ actual size. 4 complement fixation tests for histoplasmosis: 1 suspicious, 3 negative.

Figure 49 Case 16, 11–8–45, white female, age 11 Pneumonic lesion right fourth and fifth interspaces with enlarged nodes.

Figure 50. Same film as above. Lesion $^2/_3$ actual size.

Figure 51. Case 16, 1-29-49.

Figure 52. Same film as above. Lesion ⅔ actual size. No cultural studies. 1 suspicious complement fixation test for histoplasmosis, December 1947.

Figure 53 Case 17, 11–5–45, white female, age 7 Nodular lesion right second interspace with enlarged nodes

Figure 54 Same case, 3–9–48 New pneumonic lesion left third interspace with enlarged nodes (no symptoms) which disappeared by 3–22–48.

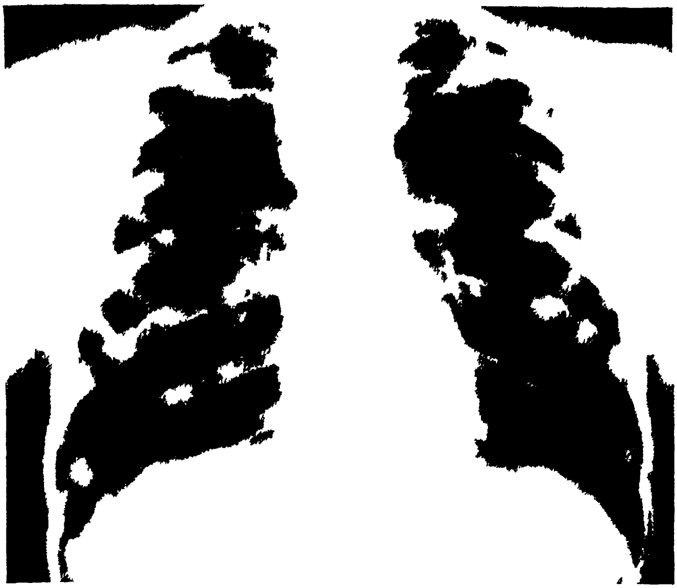


Figure 55. Case 17, 8–31–48. Lesion on left now absent.

Figure 56. Same film as above. Lesion ⅔ actual size. 6 complement fixation tests for histoplasmosis: first 3 positive, last 3 suspicious.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 15, 1949

A total of 1,207 cases of poliomyelitis was reported during the current week, as compared with 1,586 last week, a decrease of 379 cases, or 23.9 percent. The median figure of the corresponding weeks of the past 5 years is 711. Increases totaling an aggregate of 63 cases were reported in 15 States and the District of Columbia. Only Oregon reported an increase of more than 8 cases (from 23 last week to 33 currently). For the individual States the range in cases recorded during the week was from no cases in 4 States (Arizona, Delaware, New Hampshire and Wyoming) to 81 and 182 cases in Michigan and New York, respectively. For the year to date (41 weeks) a total of 35,943 cases has been reported, as compared with 21,510 for the same period last year and a 5-year median of 16,134.

No unusual incidence in the reportable diseases was evident for the current week. Tularemia cases increased from 2 last week to 15 currently in 9 States. Four of these cases were recorded in Texas. Diphtheria and meningitis increased slightly for the week but remained below the median.

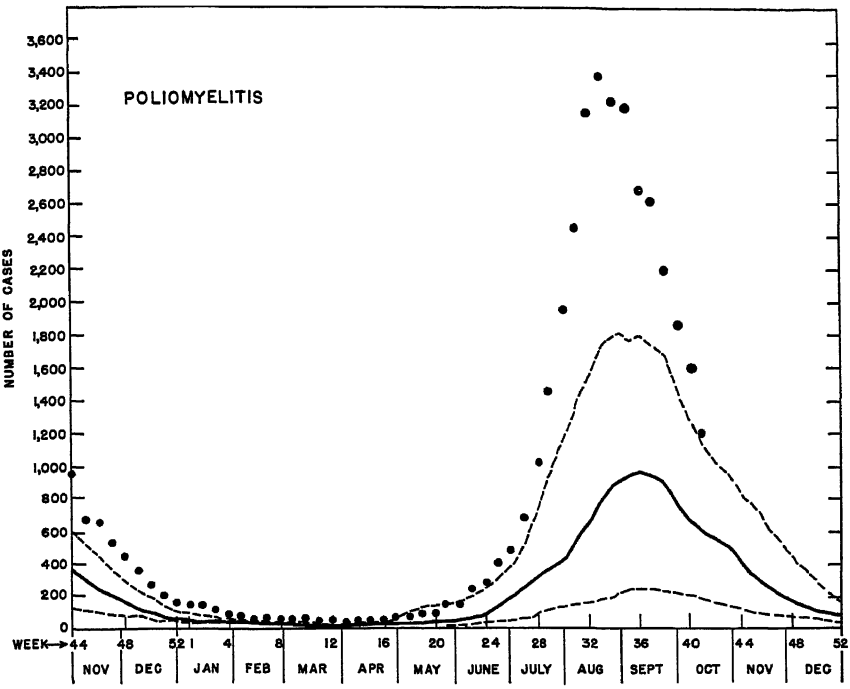
Reported cases of influenza for the week remained low, totaling 1,082, or slightly more than half the 5-year median of 2,010. Total influenza cases reported to date is 83,939 as compared to 150,301 cases reported for the corresponding period last year.

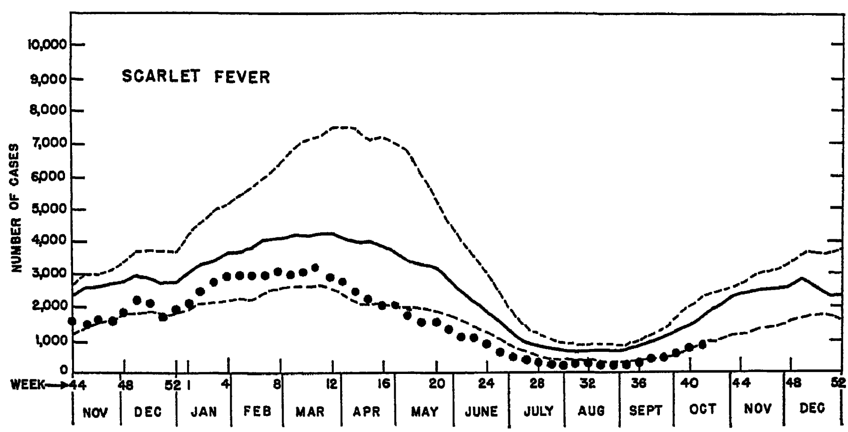
The reported cases of rabies in animals for the current week was 79 as compared to 86 for the preceding week. Current reports were received from 32 States, 18 of which reported no cases. Texas with 20 cases was highest for the week, followed by New York with 11, Indiana with 9, and Ohio, Georgia and Oklahoma with 5 cases each. The total number of cases of rabies in animals reported to date is 4,548.

A total of 8,750 deaths was recorded during the week in 94 large cities in the United States, as compared with 9,071 last week, 8,540 and 8,814, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year median (1946–48) of 8,773. For the year to date the total is 375,626, as compared with 376,969 for the same period last year. Infant deaths totaled 668, last week 646, same week last year 631, 3-year median 705. The cumulative figure is 26,851, same period last year 25,601.

Communicable Disease Charts

All reporting States, November 1948 through October 15, 1949





The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is the median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1948.

Telegraphic case reports from State health officers for the week ended Oct. 15, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	------	------	------	22	2	7	8	------	2	------	------	------	4	------
New Hampshire	------	------	------	------	------	------	------	------	------	------	------	------	6	------
Vermont	------	------	------	43	------	------	10	------	------	------	------	------	1	------
Massachusetts	1	1	------	19	------	------	50	------	24	------	------	------	69	------
Rhode Island	------	------	------	------	------	1	12	------	3	------	------	------	11	------
Connecticut	1	------	1	12	1	32	19	------	9	------	------	------	61	------
MIDDLE ATLANTIC														
New York	3	2	[c] 3	50	4	161	182	------	49	------	------	4	155	11
New Jersey	1	------	5	26	1	19	64	------	9	------	------	2	87	------
Pennsylvania	1	------	------	18	5	53	33	------	26	------	------	2	148	------
EAST NORTH CENTRAL														
Ohio	3	------	4	16	2	90	17	------	96	------	------	3	64	5
Indiana	8	1	11	13	1	5	43	------	33	------	------	1	12	9
Illinois	------	1	------	12	4	51	79	------	28	------	1	3	97	4
Michigan [a]	1	------	1	43	2	14	[1] 81	------	60	------	------	3	121	1
Wisconsin	------	------	6	33	1	3	26	------	23	------	------	------	67	------
WEST NORTH CENTRAL														
Minnesota	------	1	------	4	------	14	23	------	16	------	------	3	1	------
Iowa	1	------	------	12	------	------	37	------	10	------	------	------	------	4
Missouri	2	------	------	1	1	15	27	------	8	------	2	6	10	------
North Dakota	------	------	2	4	------	------	7	------	1	------	------	1	4	------
South Dakota	------	5	------	1	------	------	10	------	3	------	------	------	------	------
Nebraska	------	------	10	6	------	5	21	------	23	------	------	------	------	------
Kansas	1	1	------	3	------	11	24	------	2	------	------	------	15	------
SOUTH ATLANTIC														
Delaware	------	------	------	2	------	------	------	------	------	------	------	------	16	------
Maryland [a]	2	------	1	4	------	26	15	2	[d] 10	------	------	1	25	------
District of Columbia	------	------	------	1	------	14	7	------	2	------	------	1	1	------
Virginia	6	------	93	1	------	28	11	1	18	------	------	2	28	2
West Virginia	7	------	7	17	1	2	5	------	11	------	------	4	17	------
North Carolina	40	------	------	13	3	------	[1] 8	------	88	------	1	1	7	------
South Carolina	7	------	12	1	------	8	3	------	11	------	------	1	------	4
Georgia	28	------	9	3	1	6	[1] 8	2	21	------	1	3	1	5
Florida	2	------	------	3	------	20	5	------	3	------	1	------	------	------

EAST SOUTH CENTRAL														
Kentucky	10			3	3	6	21		27			4	3	3
Tennessee	21		16	18	2	47	12	1	58		2	2	13	
Alabama	11	1	15			21	9		10			2	3	
Mississippi [a]	14		1	3		15	6		10				8	
WEST SOUTH CENTRAL														
Arkansas	6		35	3	1	27	[1] 9		2		2	2	7	1
Louisiana	6			4		13	4		3			1	1	
Oklahoma	3	1	31	3	2	20	29		3		1		7	5
Texas	30	1	726	23	5	199	36		8		4	6	66	20
MOUNTAIN														
Montana	1	1		34		2	4		3				4	
Idaho	1		8	4		3	16		[d] 6					
Wyoming				7					2				1	
Colorado	2	1	42	5	2	21	31		11			4	6	
New Mexico			1	7	1	4	16		2			1	4	
Arizona			27	8		9			2				4	
Utah [a]		1	1	11			19		2				6	
Nevada				1			2		2					
PACIFIC														
Washington			2	14	2	6	21		15				11	
Oregon	7		11	12		19	33		12				8	
California	11	1	1	32	2	24	74		[d] 36			10	103	2
Total	241	19	1,082	605	49	1,006	1,207	6	803		15	73	1,280	
Median, 1944–48	344	10	1,473	814	74		711	5	1,132	1	14	101	1,435	
Year to date 41 weeks	5,736	632	83,939	591,650	2,705	62,765	[1] 35,913	541	62,226	44	935	3,093	49,411	
Median, 1944–48	9,268	515	198,538	556,638	4,939		16,134	506	93,055	286	749	3,364	78,899	
Seasonal low week ends	(27th) July 9		(30th) July 30	(35th) Sept. 3	(37th) Sept. 17		(11th) Mar. 19		(32d) Aug. 13	(35th) Sept. 3		(11th) Mar. 19	(39th) Oct. 1	
Since seasonal low week	1,968		8,072	3,132	189		[1] 35,027		3,966	3		2,633	2,809	
Median, 1944–45 to 1948–49 [b]	3,500		8,531	3,725	273		15,871		6,760	13		2,889	3,024	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods (1944–45 to 1948–49).
[c] New York City only.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately as follows: Indiana 1, Minnesota 1, Missouri 6, West Virginia 1, North Carolina 1, Alabama 1, Louisiana 1, Texas 2, Colorado 1, California 8. Cases reported as Salmonella infection not included in the table were as follows: Massachusetts 2, New York 1.
[1] Poliomyelitis—Deductions: Michigan, week ended Sept. 3, 1 case, week ended Oct. 8, 2 cases; North Carolina week ended Oct. 1, 1 case; Georgia, week ended Sept. 10, 1 case; Arkansas, week ended Aug. 6, 1 case.
Relapsing fever: California, 1 case.
Alaska: Measles 2, pneumonia 1, scarlet fever 1, septic sore throat 9.
Hawaii Territory: Influenza 1, measles 3, scarlet fever 2.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—According to information dated October 5, 1949, plague infection was reported proved positive on September 20, 1949, in 1 rat, found dead in Hamakua District, Island of Hawaii, T. H., District 1A, Kukuihaele.

Panama Canal Zone

Notifiable diseases—August 1949.—During the month of August 1949, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	3		1		10		2		16	
Diphtheria	2	1			1		2		5	1
Dysentery:										
Amebic	3						3		6	
Bacillary	1		2				1		4	
Hepatitis, infectious					1				1	
Malaria [2]	3	1			9		79		91	1
Measles			2						2	
Meningitis, meningococcal		2		2				1		5
Mumps					1				1	
Pneumonia		4		6	10	1		3	[3] 10	14
Poliomyelitis	1								1	
Tetanus	1								1	
Tuberculosis		15		3				5	([3])	23
Typhoid fever							1		1	
Typhus fever (murine)	1				1				2	
Whooping cough		2			8				[3] 8	2
Yaws							3		3	
Yellow fever								2		2

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 1 recurrent case.
[3] Reported in the Canal Zone only.

DEATHS DURING WEEK ENDED OCT. 15, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Oct. 15, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,750	8,540
Median for 3 prior years	8,773	
Total deaths, first 41 weeks of year	375,626	376,969
Deaths under 1 year of age	668	631
Median for 3 prior years	705	
Deaths under 1 year of age, first 41 weeks of year	26,851	27,365
Data from industrial insurance companies:		
Policies in force	70,078,686	70,832,898
Number of death claims	9,468	9,292
Death claims per 1,000 policies in force, annual rate	7.0	6.9
Death claims per 1,000 policies, first 41 weeks of year, annual rate	9.1	9.3

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended September 24, 1949.—During the week ended September 24, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	New-foundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			14	1	36	45	9	10	23	15	153
Diphtheria	1		1		3	2					7
Dysentery, bacillary					6	2	1				9
Encephalitis, infectious							4	2			6
German measles						5	1		7	3	16
Influenza			20			4				2	26
Measles			44		27	29	41	49	15	48	253
Meningitis, meningococcal							1	1		2	4
Mumps			12		3	30	3	9	10	40	107
Poliomyelitis			5	1	25	34	8	4	8	13	98
Scarlet fever				1	22	8	2		16	4	53
Tuberculosis (all forms)	11		7	15	74	12	46	4	24	32	225
Typhoid and paratyphoid fever					70	8		2	1	4	85
Undulant fever			1				3				4
Venereal diseases:											
Gonorrhea	6	1	7	7	119	72	31	13	59	73	388
Syphilis	3		5	2	59	31	8	6	5	20	139
Other forms										3	3
Whooping cough	1				89	42	2	3		2	139

CUBA

Habana—Notifiable diseases—5 weeks ended July 30, 1949.—During the 5 weeks ended July 30, 1949, certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	4		Poliomyelitis	1	
Diphtheria	9	1	Scarlet fever	1	
Leptospirosis	1		Tuberculosis	8	
Malaria	5		Typhoid fever	18	3
Measles	7				

Provinces—Notifiable diseases—5 weeks ended July 30, 1949.—During the 5 weeks ended July 30, 1949, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	6	12	7	20	3	14	62
Chickenpox		5					5
Diphtheria	1	11	2	5	1	6	26
Leprosy		14				3	17
Malaria	1	5	1	1	7	17	32
Measles		9	1		2		12
Poliomyelitis		1		1		4	6
Scarlet fever		1					1
Tuberculosis	7	20	14	13	44	25	123
Typhoid fever	2	19	7	17	12	23	80
Undulant fever						3	3
Whooping cough		7			1	1	9
Yaws						17	17

[1] Includes the city of Habana.

FINLAND

Notifiable diseases—August 1949.—During the month of August 1949, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	2	Poliomyelitis	44
Diphtheria	90	Scarlet fever	154
Dysentery	3	Syphilis	40
Gonorrhea	850	Typhoid fever	29
Paratyphoid fever	156		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Brazil.—During the period January 1–April 30, 1949, 31 cases of plague, with 2 deaths, were reported in Brazil, distributed as follows: January 1–31—Bahia State, Serrinha County 7 cases, Feira County 3 cases; Pernambuco State, Caruara County 1 case, 1 death, Garanhuns County 2 cases, Panelas County 1 case; February 1–28—Bahia State, Serrinha County 2 cases; Pernambuco State, Araripina County 1 case, Garanhuns County 1 case; March 1–31—Bahia State, Feira County 1 case; Pernambuco State, Bom Conselho County 4 cases, Garanhuns County 1 case; April 1–30, Pernambuco State, Garanhuns County 6 cases, Bezerros County 1 case, 1 death.

Netherlands Indies—Java—Jogjakarta.—During the week ended September 16, 1949, 36 fatal cases of plague were reported in Jogjakarta Residency, Java. For the week ended October 8, 1949, 11 cases were reported in the city of Jogjakarta.

Smallpox

Colombia.—During the month of August 1949, 235 cases of smallpox (alastrim) were reported in Colombia, 33 of which were stated to have occurred in the city of Medellin.

Netherlands Indies—Java.—Smallpox has been reported in cities in Java as follows: Week ended October 8, 1949, Batavia 148 cases, Pekalongan 20 cases, Semarang 28 cases, Tegal 11 cases; week ended October 1, Batavia 253 cases; week ended September 10, Bandoeng 56 cases, Cheribon 44 cases.

Typhus Fever

Colombia.—During the period August 1–31, 1949, 258 cases of typhus fever were reported in Colombia (including cases of murine type). Twenty-one of these cases were reported in Medellin, all murine type.

Great Britain—England and Wales.—During the week ended September 17, 1949, 4 cases of murine typhus fever were reported in Newport, Monmouthshire, England.

Yellow Fever

Gold Coast.—On September 1, 1949, 1 suspected case of yellow fever was reported at Atiankama, Oda area, Gold Coast.

Examination for Chemists and Biochemists

Examinations for scientists and sanitarians (chemists and biochemists) in the United States Public Health Service Regular Commissioned Corps will be held January 9–11, 1950, in various cities throughout the country. Completed applications must be in the Washington Office by December 12, 1949.

Appointments are permanent and provide opportunities for career service in research and public health activities. Benefits include periodic pay raises and promotions; liberal retirement provision; medical care, annual and sick leave.

Appointments will be made in the grades of assistant and senior assistant, equivalent to Army ranks of first lieutenant and captain, respectively. Entrance pay is $3,811 for assistant (with dependents) and $4,489 for senior assistant (with dependents), including rental and subsistence allowance.

Minimum requirements for chemist and biochemist in the scientist category are 7 years training and experience after high school, including a doctor's degree from a recognized university. Minimum requirements for chemist in the sanitarian category are 7 years post-high school training and experience, including a master's degree from an approved university.

For application forms and additional information write to Surgeon General, Public Health Service, Federal Security Agency, Washington 25, D. C., Attention: Division of Commissioned Officers.

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25. D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 **NOVEMBER 11, 1949** NUMBER 45

IN THIS ISSUE

Effect of Topically Applied Fluoride on Dental Caries
Operation Studies of Home Milk Pasteurizers
Histoplasmosis in Rats and Skunks

FEDERAL SECURITY AGENCY

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PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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CONTENTS

Page

The effect of topically applied fluorides on dental caries experience. VII. Consolidated report of findings for four study groups, showing reduction in new decay by individual tooth and by tooth surface, and frequency distribution of newly decayed teeth in treated and untreated mouth halves. John W. Knutson and Grace C. Scholz ---- 1403

Operation studies of home milk pasteurizers. Robert C. Thomas ---- 1411

Histoplasmosis in rats and skunks in Georgia. C. W. Emmons, H. B. Morlan and E. L. Hill ---- 1423

INCIDENCE OF DISEASE

United States:
- Reports from States for week ended October 22, 1949 ---- 1431

Foreign reports:
- Canada—Provinces—Notifiable diseases—Week ended October 1, 1949 ---- 1434
- Cuba—
  - Habana—Notifiable diseases—4 weeks ended August 27, 1949 ---- 1434
  - Provinces—Notifiable diseases—4 weeks ended August 27, 1949 ---- 1434
- Jamaica—Notifiable diseases—5 weeks ended October 1, 1949 ---- 1435
- Norway—Notifiable diseases—July 1949 ---- 1435
- Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—
  - Plague ---- 1436
  - Smallpox ---- 1436
  - Typhus fever ---- 1436

Deaths during week ended October 22, 1949 ---- 1437

Public Health Reports

Vol. 64 • NOVEMBER 11, 1949 • *No. 45*

The Effect of Topically Applied Fluorides On Dental Caries Experience

VII. Consolidated report of findings for four study groups, showing reduction in new decay by individual tooth and by tooth surface, and frequency distribution of newly decayed teeth in treated and untreated mouth halves

By JOHN W. KNUTSON, D. D. S., Dr. P. H., and GRACE C. SCHOLZ, B. A.*

Previously reported studies in this series (*1–6*) have been concerned with the over-all effect of topically applied fluorides on dental caries experience in the permanent teeth of children. In summary, these studies indicate:

1. A series of four topical applications of a 2 percent solution of sodium fluoride, preceded by dental cleansing, effects a 40 percent reduction in dental caries incidence. More than four applications do not increase the caries-prophylactic effect.
2. The caries-inhibiting value of topically applied sodium fluoride is not appreciably decreased during a 3-year period following treatment.
3. The omission of dental cleansing prior to a series of applications reduces the effectiveness of the fluoride applications by approximately one-half.
4. Application of a saturated solution of lead fluoride (0.06 percent), using the same application technique as for solutions of sodium fluoride, is not associated with a significant reduction in the incidence of dental caries.
5. The application of a 2 percent solution of sodium fluoride to the teeth, followed immediately by a 5 percent solution of calcium chloride, does not increase the caries-prophylactic effect accomplished by the use of a solution of sodium fluoride alone.
6. An increase in the time interval between applications of the fluoride solution in a given series of applications from one or two a week to one each 3 to 6 months decreases the caries-prophylactic effect observed.
7. A concentration of 1 percent solution of sodium fluoride appears

*From the Division of Dental Public Health, Public Health Service.

to be equally as effective in inhibiting new dental caries as a 2 percent solution.

In four groups previously studied (*1, 5, 6*) a series of 4 or more applications of sodium fluoride solution effected approximately a 40 percent reduction in caries incidence during a one-year study period. Inasmuch as none of these studies is based on a large enough sample of children to determine reductions in dental caries by individual tooth type or tooth surface, the data for the four groups have been combined. The purpose of this study is to present for different kinds of teeth, and by tooth surface, the reduction in new caries effected by topical fluoride applications. In addition, the distribution of caries experience in fluoride-treated and untreated mouth halves is compared in order to determine the variation in individuals of the caries-prophylactic effect of topical sodium fluoride. Identification of the study groups according to previous report and the age classification of children in each group are presented in table 1.

Table 1. *Age distribution of four groups of school children examined 1 year after a series of fluoride applications had been made to the teeth in half the mouth of each child*

Number of applications	All ages	Children by age at time of treatment								
		7	8	9	10	11	12	13	14	15
Group No. 1[1]	288	10	18	26	41	39	50	44	50	10
Group No. 2[2]	225	17	18	32	31	31	28	25	26	17
Group No. 3[3]	259	35	30	26	40	40	31	25	27	5
Group No. 4[4]	260	30	46	33	28	46	32	29	13	3
Total	1,032	92	112	117	140	156	141	123	116	35

[1] 8–15 applications, 2 percent NaF, following initial cleansing, Arlington, North Mankato, St. Louis Park, Minn. (*1*).
[2] 4 applications, 2 percent NaF, following initial cleansing, Miami County, Ohio (*5*).
[3] 6 applications, 2 percent NaF, following initial cleansing, Miami County, Ohio (*5*).
[4] 4 applications, 1 percent NaF, following initial cleansing, Miami County, Ohio (*6*).

In the first study group, teeth in the left side of the mouth were treated, while teeth in the right side of the mouth served as controls. In each of the three other study groups, approximately half of the children received treatment on teeth in the left side of the mouth and the other half on teeth in the right side of the mouth. Fine pumice paste and a motor driven rubber cup were used for cleansing the teeth. A detailed dental examination was made with plane mirror and explorer under artificial light and with compressed air available for use at the discretion of the examiner. The method of fluoride application consisted of isolating the teeth on the treated side with cotton rolls, drying with compressed air, and wetting the crown surfaces of the teeth with fluoride solution. The applied solution was allowed to dry in air for from 3 to 4 minutes; then the cotton rolls were removed and the child dismissed.

One year after the series of applications was begun, the children were re-examined. The examiner did not know which teeth had been

treated or which were untreated controls. Analysis of the data on caries experience is confined to the erupted permanent teeth present at the time of the initial examination and fluoride application.

New Caries Reduction in All Teeth

The caries experience during a study year in fluoride-treated and untreated teeth of children in the four study groups is shown in table 2. At the time of initial examination approximately the same number of noncarious or sound permanent teeth were available in treated and untreated mouth quadrants. During the year, among the 1,032 children under study, the percentage reduction in caries attack on fluoride-treated as compared with untreated teeth was 40.3 percent. For the four studies separately, the reduction ranged from 38.7 percent to 41.7 percent.

Table 2. *Dental caries experience during a 1-year study period in fluoride-treated and untreated teeth of 1,032 children*

Quadrants	Initially noncarious teeth	Teeth becoming carious during study period	Percent attacked by caries	Quadrants	Initially noncarious teeth	Teeth becoming carious during study period	Percent attacked by caries
Treated:				Untreated:			
Upper	3,466	239	6.9	Upper	3,492	414	11.9
Lower	3,964	176	4.4	Lower	3,968	281	7.1
Total	7,430	415	5.6	Total	7,460	695	9.3

New Caries Reduction by Tooth

The measurement of percentage reduction in new caries, by comparing treated with untreated teeth, is based on the bilaterally equal occurrence of dental caries in left and right mouth quadrants of large groups of children. This bilateral symmetry in caries experience is also characteristic of homologous teeth on opposite sides of the mouth. Reduction in new decay, by tooth, is measured therefore by comparing the increment of caries in specific treated teeth with that in corresponding homologous teeth which were untreated.

Inasmuch as the increment of dental caries in certain teeth, such as lower incisors, is relatively small during a single year, even in the number of children included in this study, it is desirable to indicate which of the figures presented here can be considered statistically significant. For the purposes of this report, a probability of 0.0227 or less that an observed difference in rate of decay between teeth treated and untreated is due to chance is considered statistically significant.

The caries experience in two pairs of upper teeth (central incisor

and cuspid) and in three pairs of lower teeth (central and lateral incisors, and cuspid) was relatively small, and the number of children in this study is not sufficiently large to establish that the observed caries reduction in these particular teeth was not due to chance (table 3). Less than 15 percent of total new decay occurring in upper teeth and only 7 percent of that occurring in lower teeth during a single study year affected these teeth.

Table 3. *Percent less initial caries attack in fluoride-treated than in untreated teeth of 1,032 children, by specific tooth*

Teeth	Mouth quadrants			Teeth	Mouth quadrants		
	Upper	Lower	Both		Upper	Lower	Both
Central incisor	22.7	44.4	26.4	First molar	*34.7	*22.2	*28.7
Lateral incisor	*50.7	12.5	*46.8	Second molar	*46.7	*49.5	*48.1
Cuspid	33.3	66.7	41.7				
First bicuspid	*46.8	*52.0	*48.6	All teeth	*42.3	*37.4	*40.3
Second bicuspid	*50.9	*34.7	*43.3				

*Statistically significant.

Among the upper teeth for which the sample size is large enough to demonstrate statistical significance in the reduction in new caries, the range in reduction in treated teeth was from 34.7 percent in first molars to 50.9 percent in second bicuspids. In upper second molars, first bicuspids, and lateral incisors the reductions were 46.7, 46.8, and 50.7 percent, respectively.

In upper central incisors, a 22.7 percent reduction in new caries in treated teeth was found. The probability that this or a greater reduction is due to chance is 0.1515, and therefore is not statistically significant. Inasmuch as the mesial surface of the untreated central incisor is almost certain to be wet in most cases when fluoride solution is applied to the same surface of the homologous tooth in the treated half of the mouth, the amount of reduction in new decay observed in this tooth must be analyzed on the basis of this condition. When the analysis is made separately for the observed increment of new caries on mesial and on distal surfaces of the upper central incisor. it is found that mesial surface decay is slightly greater in treated than in untreated teeth, while distal surface decay was reduced approximately 40 percent.

Among lower teeth, the fluoride applications effected the lowest significant reduction in initial caries attack in first molars—22.2 percent, and the highest in first bicuspids—52.0 percent. New caries in lower second bicuspids was reduced 34.7 percent and in second molars 49.5 percent.

The number of teeth classified as sound or noncarious on initial examination and the proportion that became carious during a study year, by tooth type, and by treated and untreated mouth quandrants are shown in table 4.

Table 4. *Number of initially noncarious teeth, and percent attacked by caries in fluoride-treated and untreated teeth of 1,032 children, by specific tooth*

Teeth	Mouth quadrants											
	Upper				Lower				Both			
	Initially noncarious teeth		Percent attacked by caries		Initially noncarious teeth		Percent attacked by caries		Initially noncarious teeth		Percent attacked by caries	
	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated
Central incisor	810	803	4.2	5.5	1,001	998	0.5	0.9	1,811	1,801	2.2	2.9
Lateral incisor	720	729	4.7	9.5	967	969	.7	.8	1,687	1,698	2.4	4.5
Cuspid	473	461	1.3	2.0	613	615	.2	.5	1,086	1,076	.6	1.1
First bicuspid	532	539	4.7	8.7	586	592	2.0	4.2	1,118	1,131	3.3	6.4
Second bicuspid	422	449	6.4	12.2	431	419	7.4	11.7	853	868	6.9	12.0
First molar	294	293	21.8	33.4	199	199	35.2	45.2	493	492	27.2	38.2
Second molar	215	218	22.7	42.2	167	176	29.2	55.1	382	394	25.7	48.0
All teeth	3,466	3,492	6.9	11.9	3,964	3,968	4.4	7.1	7,430	7,460	5.6	9.3

New Caries Reduction by Tooth Surface

The reduction in new caries in all surfaces of fluoride-treated sound teeth in upper mouth quadrants for children in the four study groups was 40.6 percent, and in lower mouth quadrants the reduction was 34.1 percent (table 5).

Table 5. *Percent less initial caries attack in tooth surfaces of fluoride-treated than in untreated teeth of 1,032 children, by specific tooth surface*

Tooth surfaces	Mouth quadrants			Tooth surfaces	Mouth quadrants		
	Upper	Lower	Both		Upper	Lower	Both
Occlusal	*42.4	*37.9	*40.2	Buccal and labial	38.0	*50.0	*48.1
Mesial	*41.0	0	*31.3	All tooth surfaces	*40.6	*34.1	*37.9
Distal	*45.1	4.5	*35.5				
Lingual	14.3	100.0	22.6				

*Statistically significant.

In upper teeth, the reduction in new carious surfaces associated with topical fluoride applications was slightly greater for distal surfaces (45.1 percent) than for occlusal surfaces (42.4 percent). On mesial surfaces the initial caries attack was reduced 41.0 percent. This high proportionate reduction in new decay on interproximal surfaces is of particular interest since the dental cleansing which precedes topical fluoride applications is not a complete dental prophylaxis and the interproximal surfaces are not cleansed as thoroughly as the more accessible surfaces.

In upper mouth quadrants, more than half of the total new caries, by surfaces, in both treated and untreated teeth were occlusal surface

caries. Approximately 40 percent of the total occurred on interproximal surfaces (mesial and distal). Buccal and labial surface caries was relatively negligible, and the 38.0 percent difference between treated and untreated for this surface classification is not statistically significant. A similar conclusion applies to the 14.3 percent reduction observed for the lingual surface.

In lower teeth, statistically significant reductions can be demonstrated only for new caries on occlusal surfaces—37.9 percent reduction, and on buccal and labial surfaces—50.0 percent reduction. More than three-quarters of total new decay in both treated and untreated teeth in lower mouth quadrants occurred on occlusal surfaces. Little or no reduction was noted for the mesial or distal surfaces of lower teeth. This latter finding is noteworthy since it may indicate a failure to wet these surfaces properly with the technique employed.

The detailed data on caries experience by tooth surface in treated and untreated mouth quadrants are shown in table 6.

Table 6. *Number of initially noncarious tooth surfaces, and percent attacked by caries in fluoride-treated and untreated teeth of 1,032 children, by specific tooth surface*

Tooth surfaces	Mouth quadrants											
	Upper				Lower				Both			
	Surfaces initially noncarious		Percent attacked by caries		Surfaces initially noncarious		Percent attacked by caries		Surfaces initially noncarious		Percent attacked by caries	
	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated
Occlusal	3,466	3,492	3.9	6 8	3,964	3,968	3.4	5 5	7,430	7,460	3 7	6 1
Mesial	3,466	3,492	1.8	3,0	3,964	3,968	.8	.7	7,430	7,460	1.2	1 8
Distal	3,466	3,492	1.1	2 0	2,964	3,968	.5	.6	7,430	7,460	.8	1 2
Lingual	3,466	3,492	.7	8	3,964	3,968	.0	.1	7,430	7,460	.3	.4
Buccal and labial	3,466	3,492	.1	.2	3,964	3,968	.6	1 1	7,430	7,460	.4	.7
All tooth surfaces	17,330	17,460	1.5	2 6	19,820	19,840	1.1	1.6	37,150	37,300	1.3	2.1

Frequency Distribution of Newly Carious Teeth in Treated and Untreated Mouth Halves

In the foregoing sections the caries reduction in individual teeth and on separate classes of tooth surfaces has been presented. The purpose of this section is to study the variation in effectiveness of the topical fluoride procedure on the teeth of individual children in the study group. In making this analysis the number of newly carious teeth occurring in each treated and untreated half of the mouth of each child is determined and the results arrayed in a frequency distribution.

The frequency distribution of the number of newly carious teeth

within treated and untreated mouth halves for the 1,032 children in the four study groups is given in table 7. This distribution shows that the maximum number of carious teeth in the fluoride-treated side of the mouth is three and for the untreated half, five. Furthermore, the number of children with one, two, or three newly carious teeth in treated mouth halves is considerably less than those having equal numbers in untreated upper and lower mouth quadrants. On the other hand, the proportion of treated mouth halves in which no new decay occurred during the study year was substantially increased over the corresponding number of caries-free untreated mouth halves. In general, these findings indicate that the reduction in caries incidence effected by topical fluoride applications in a large group of children is the result of a fairly uniform lowering of the number of newly carious teeth each child would have had if the teeth had remained untreated.

Table 7. *Frequency distribution of number of initially carious teeth accrued during study year in treated and untreated mouth halves of 1,032 children*

Number of newly carious teeth	Number of mouth halves					
	Untreated		Treated		Theoretical*	
	Number	Percent	Number	Percent	Number	Percent
0	546	52.9	703	68.1	678	65.7
1	329	31.9	253	24.5	295	28.6
2	114	11.0	66	6.4	55	5.3
3	35	3.4	10	1.0	4	.4
4	6	.6				
5	2	.2				
Total	1,032	100.0	1,032	100.0	1,032	100.0

*Assuming newly carious teeth in untreated mouth halves reduced by 40 percent.

This conclusion can be subjected to further examination by arbitrarily applying a 40-percent reduction to the caries experience observed in the control or untreated teeth of each child, arraying the results in a frequency distribution, and comparing this theoretical distribution with that observed for treated mouth halves. Under this method all children who actually experienced five newly carious teeth in the untreated group would be expected to have only three newly carious teeth had they been treated. Those actually experiencing four newly carious teeth would have two in most cases, but some would have three in order that the average be a 40-percent reduction. The resulting theoretical distribution is also presented in table 7. Comparison of the percent of mouth halves in each class according to number of newly carious teeth reveals a striking similarity between the treated, or observed, and the theoretical. Thus, this result supports the general conclusion that a series of four fluoride applications reduces dental caries incidence approximately 40-percent and that all children treated benefit to this extent.

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Summary

Previously presented data relating to the reduced incidence of dental caries in fluoride-treated as compared with untreated permanent teeth of 1,032 children have been presented and analyzed separately for each tooth type and tooth surface. In summary, the analysis indicates that:

1. For the study group included in this presentation, the over-all reduction in newly carious teeth in fluoride-treated as compared with untreated teeth was 40.3 percent—42.3 percent for teeth in upper mouth quadrants and 37.4 percent for teeth in lower mouth quadrants.
2. Among teeth in upper mouth quadrants, except central incisors and cuspids, the reductions varied from 34.7 percent for first molars to 50.9 percent for second bicuspids.
3. Among teeth in lower mouth quadrants, except incisors and cuspids, the reductions varied from 22.2 percent for first molars to 52 percent for first bicuspids.
4. The over-all reduction in newly carious tooth surfaces in fluoride-treated as compared with untreated teeth averaged 37.9 percent—40.6 percent in upper mouth quadrants, and 34.1 percent in lower mouth quadrants.
5. For upper teeth alone, the reduction in new decay on distal surfaces exceeded that on occlusal surfaces (45.1 percent on distal; 42.4 percent on occlusal), while mesial surface decay was lowered as the result of fluoride applications by 41.0 percent.
6. Comparison of the distribution of the number of newly carious teeth in treated and untreated mouth halves and a theoretical distribution calculated by applying a 40-percent reduction to the number of carious teeth observed in each untreated mouth half indicates that the caries prophylactic effect of topical sodium fluoride is remarkably uniform for individual children.

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Operation Studies of Home Milk Pasteurizers

By Robert C. Thomas, M. S.

To protect the health of rural families without access to a commercially pasteurized milk supply, there has been a demand in the past few years for a milk pasteurization unit in the home. This is especially true where the problem of eradication of *Brucella* infection in cattle has impressed upon the minds of the people the dangers of the spread of this infection to the consumers of milk obtained from infected animals. To meet the demand for a method of heating milk in the home, the Public Health Service in 1934 (*2*) recommended that the milk be placed in an aluminum vessel on a hot flame and stirred constantly until it is heated to 155° F., then immediately setting the vessel in cold water and continuing stirring until cool. In 1940 (*2*), following some research by the Public Health Service on heating milk inoculated with a test organism (*4*), the recommended temperature was increased to 165° F.

Trout, Devereux, and Bryan in 1943 (*10*) reported experiments using the following methods of heating: (*a*) double boiler, starting either with cold or (*b*) with vigorously boiling water; (*c*) direct heat; and (*d*) in-the-bottle. Part of the summary and conclusions of this article was: "A safe, adequately pasteurized milk can be produced by heating one or two quart quantities of milk for 10 minutes in a covered double boiler containing one quart of vigorously boiling water." In 1945 (*1*) the University of Minnesota published a circular on the use of direct heat and the double boiler method for heating milk in the home. Schaenzer and Shiozawa in 1946 (*5*) described several methods of pasteurization for small retail dairies and also described three units classified as home milk pasteurizers.

With the extension of electric service into rural areas, several manufacturers and the Rural Electrification Administration of the U. S. Department of Agriculture became interested in the development of an automatic electric home milk pasteurizer. This type of equipment also is popular with families who have consumed pasteurized milk in the city and spend their vacations in the rural lake sections of the country where a pasteurized milk supply may not be available. In 1947 Trout and Bortree (*9*) reported on three types of home electric milk pasteurizers. They gave certain precautions for operation of these units, such as (1) operation for a longer period of time than that

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suggested by the manufacturer; (2) allowing sufficient head room for milk expansion upon heating in order to guard against contamination by bacteria growing in milk that may ooze out from the top of the container; (3) care of control of the water level in the in-the-bottle unit to prevent cooling water from being drawn into the bottles.

All of the above work was based largely upon reducing the number of bacteria and the inactivation of phosphatase in the main body of the milk. The fundamental principle back of the modern ordinance requirement for heating the air above the milk surface in batch pasteurizers was not considered.

Commercial Pasteurization

As these automatic units reached the market, health departments throughout the country received requests for information on the effectiveness of the heat treatment of milk by the different units. Such requests were referred to this laboratory and a study was started on the various units available at that time. Because a number of these requests were from people who wished to sell pasteurized milk, the units were first studied from the standpoint of the following definition of pasteurized milk as given in the 1939 Milk Ordinance and Code recommended by the Public Health Service (*3*). "The term 'pasteurization, pasteurized' and similar terms shall be taken to refer to the process of heating every particle of milk or milk products to at least 143° F., and holding at such temperature for at least 30 minutes, or to at least 160° F., and holding at such temperature for at least 15 seconds, in approved and properly operated equipment; Provided, That nothing contained in this definition shall be construed as disbarring any other process which has been demonstrated to be equally efficient, and is approved by the State health authority." Specifications included in the code are: (*a*) thermometers; (*b*) construction and operation to insure that the required pasteurization temperature and time will be applied to every particle of milk or milk products; (*c*) proper inlet, outlet valves and connections.

Due to the absence of (1) mechanical agitation of the milk in some units, (2) provision for auxiliary heating of the air above the milk surface, and (3) thermometers as part of the standard equipment, none of the units submitted for test achieved a product that complied with the above definition for pasteurized milk, and should not be accepted for commercial pasteurization in communities where the Public Health Service recommended pasteurization standards or their equivalent are in effect. In considering the cooling and bottling requirements that are necessary in connection with commercially pasteurized products, it is possible that, with further improvements, the in-bottle type

of pasteurizer might be developed to meet these requirements. Further consideration is given here to these units for use as home pasteurizers and not for commercial purposes.

Method of Study

In checking their performance, these units were operated as received with the exception of unit A, which was operated at several different heating water temperatures. Temperatures were checked with thermocouples placed at several points in the pasteurizer. Phosphatase tests were made on the main body of milk and on milk swabbed from the milk container above the milk surface line. In the phosphatase test made to check the heat treatment of milk on the container above the milk surface line, cotton on a glass applicator was used to swab milk from this surface. Glass was used in place of wood because false positive tests were obtained in some cases where the wood applicators were sterilized. This was demonstrated by positive tests in control swabs. All controls with glass applicators were negative. The amount of material picked up on the swab varied from 0.03 gram to 0.1 gram. In making the phosphatase test, the material on the swab was shaken in three ml. of boiled milk in order to obtain enough material for check tests. Because of the high dilution and the small amount of milk on the swab, a phosphatase test of less than one unit, along with thermocouple tests indicating that the surface and the air above the milk reached a temperature of at least 143° F. for the proper length of time, was considered necessary as indication of proper heat treatment.

Description of Units Studied

At the time that this study was started, there were at least four so-called home pasteurizers on the market. They could be divided into the following two types on the basis of the method of applying heat to the milk:

1. Units A, B, and C where the milk in an inner container was heated by hot water in an outer container. The water was heated directly over a hot plate (unit B) or by an immersion heater (units A and C.)
2. Unit D where the milk container was heated directly over a hot plate.

Test Results

Unit A—Milk Container Heated by Water Bath

Preliminary tests on this unit demonstrated that with the thermostat set for a temperature of 147° F. as recommended by the manu-

facturers, a period of about 37 minutes was required to heat the milk from 60° F. to 143° F. With an additional holding period of 30 minutes, the milk reached a temperature of about 146° F. or about one degree below the temperature of the heating water.

When operated under these conditions of time and temperature, a negative phosphatase test was obtained on the main body of milk. Thermocouple tests, however, indicated that the inner rim of the milk container above the milk surface line was exposed to outside air and did not receive sufficient heat treatment. Insufficient heat treatment was also demonstrated by obtaining a positive phosphatase test on milk swabbed from the inner rim of the milk container.

In a previous study reported by Thomas (*8*) using the unit A home milk pasteurizer with heating water at 147° F., coliform organisms (present in the raw milk as received) were reduced from a plate count of 580,000 per ml. to zero per ml. within 44 minutes when the milk reached a temperature of 143° F. The phosphatase in the main body of the milk was reduced to less than 2 Scharer units per ml. at 59 minutes when the milk had reached a temperature of 145.2° F. and had been held between 143° F. and 145.2° F. for 15 minutes.

Operating this unit at water temperatures of from 163° to 165° F. resulted in negative phosphatase tests on a swab sample by the New York City Laboratory Method I, but gave a positive test by the more sensitive New York City Laboratory Method II (*6*). Final rim temperatures were from 161.6° to 163.3° F., whereas air temperatures above the milk were irregular from 149° to 158.3° F. depending on outside disturbances which affected the circulation of air above the unit. Tables 1 and 2 illustrate typical tests showing temperatures obtained with thermocouples and the results of phosphatase tests

Table 1. *Temperature at various locations and phosphatase test on milk in automatic electric home pasteurizer—unit A set at 151.8° F. (typical test)*

Heating time (minutes)	Temperature and location of thermocouple				Phosphatase test Scharer units (N. Y. C. methods)	
	Air below cover (° F.)	Rim (° F.)	Milk (° F.)	Heating water (° F.)	I	II
0			50.0	151.0	>3.5	>3.5
9	100.6	102.3	110.6	134.3		
16	112.0	123.6	126.0	142.0		
21	118.6	131.6	135.0	150.6		
27	132.6	138.3	143.0	152.0		
30	130.3	141.3	144.6	150.6		
36	134.3	147.3	151.3	155.3		
44	131.3	149.3	153.0	155.3		
56	135.0	151.3	154.0	155.3		
60	142.0	152.3	154.0	155.3		
Cooled 71	100.0	87.6	80.6	70.0	0	0
Swab of surface of container above milk					1.0	>2.0

upon the main body of the milk and the milk swabbed from the milk vessel surface.

Table 2. *Temperature at various locations and phosphatase test on milk in automatic electric home pasteurizer—unit A set at 165° F. (typical test)*

Heating time (minutes)	Temperature and location of thermocouple				Phosphatase test Scharer units (N. Y. C. methods)	
	Air below cover (° F.)	Rim (° F.)	Milk (° F.)	Heating water (° F.)	I	II
0	98 2	96.4	77.7	142.7		
10	118.6	119.3	122.4	142.2		
20	133.7	140.5	142.2	156.6		
30	146.3	153.5	155.3	161.6		
40	152.6	159.4	160.7	163.0		
50	154.8	161.2	162.0	164.3		
60	155.8	161.2	162.5	164.1		
Cooled 72	93 2	78.8	68.0	64.4	0	0
Swab of inner surface of container above milk					0	<2.0

Unit B—Milk Container Heated by Water Bath

This unit heated milk from 57° to 161.3° F. in about 43 minutes. The temperature reached 143° in about 37 minutes. The air above the milk reached a maximum temperature of 157.6° F. The phosphatase test on the main body of the milk was negative at this temperature of operation but milk swabbed from the cover seat was strongly positive to the phosphatase test and also gave a positive coliform test. The maximum temperature recorded by thermocouples placed in the cover seat depression was 158.9° F. and with the positive tests indicated that momentary heating to this temperature was insufficient

Table 3. *Temperature at various locations and phosphatase test on milk in automatic electric home pasteurizer—unit B (typical test)*

Heating time (minutes)	Temperature and location of thermocouple				Phosphatase test—Scharer units (N. Y. C. method)	
	Air below cover (° F.)	In milk		Heating water (° F.)	I	II
		Surface (° F.)	Bottom (° F.)			
0	62.6		58.0	59.0		
9	68.6	65.3	63.9	77.3		
27	107.6		105.6	121.0		
31	118.0		125.0	139.3		
33	127.0		131.0			
37			143.0	154.6		
43 [1]	157.3	161.3	161.3	172.3		
Cooled 64			80.6	73.0	0	0
Swab of cover seat (coliform +)					<3 5	>3.5

[1] Buzzer indicating end of pasteurization.

heat treatment. Table 3 provides a typical record of the temperature and phosphatase tests obtained in the operation of this unit.

Unit C—Milk in Bottles Heated by Water Bath

The thermoregulator in the unit received by us was set to control the water temperature at 148° F. The instructions received with the unit stated that the thermostat in the control bottle was set to activate the timer when the water in the control bottle reached a temperature of 143° F. In actual operation, however, the timer started when the water in the control bottle reached a temperature of 137.7° to 141.4° F. The time required to reach this temperature varied from 57 to 60 minutes. The final temperature at the start of the cooling period was from 146° to 147° F. There is no mechanical agitation of the milk in the bottles and the temperature in a single bottle varied from 138.6° to 142.6° F. at the start of the timer. At the end of the holding period of 31 minutes, the temperature varied from 146.5° to 147.2° F. The temperature of the air under the cap was 141.8° F. at the start of the timer, and 144.5° F. at the end of the holding period.

In spite of the low starting temperature, all phosphatase tests on the main body of milk were negative. This was probably due to the fact that the final temperature was above 143° F. No positive phosphatase tests were obtained on the small amount of milk that could be swabbed from the bottle surface or cap seat. In these tests the 512–516 gram weight cylindrical milk bottles were used. They were filled to within 1 inch of the top with cold milk and capped with lip cover caps. The water in the bath came up to the bottom of the

Table 4. *Temperature at various locations and phosphatase tests on milk in automatic electric home pasteurizer—unit C in-bottle (typical test)*

Heating time (minutes)	Temperature and location of thermocouples					Phosphatase test—Scharer units (N. Y. C. method)	
	Control bottle (°F.)	Air below cap (°F.)	In milk				
			Top (°F.)	Middle (°F.)	Bottom (°F.)	I	II
0	59.9	63.0	56.7	57.8	51.3		
10	67.1	73.8	68.5	60.4	62.1		
20	82.8	90.5	86.9	76.6	77.4		
30	100.0	106.3	104.0	91.0	95.4		
40	118.6	122 0	119.8	112.1	113.0		
50	123.3	133.3	133.7	129.4	129.7		
58 [1]	141.3	141.8	142.6	138.6	138.6		
60	142.9	142.9	143.8	140.4	140.2		
70	145.8	144.0	145.8	144.0	144.0		
80	146.7	144.3	146.3	145.4	145.8		
89	147.6	144.5	147.2	146.5	147.2		
Cooled 107	75.2	62.6	73.4	69.8	60.8	0	0
Swab of inner surface of milk container						0	0

[1] Timer indicating start of holding period.

rolled rim of the bottle and about ⅜-inch below the cap seat. Table 4 shows that there is a variation in the temperature of the milk in different locations in an individual bottle. From a safety standpoint it would seem advisable to raise the water temperature, to set the timer control to start when the lowest milk temperature is at least 143° F., and control the inflow of cooling water so that it does not cover the top of the bottles unless they are capped with pressure-tight nonporous caps through which water cannot enter the milk during cooling. Table 4 is a typical record of temperatures recorded by one thermocouple in the control bottle and thermocouples at four points in a single bottle of milk, and of phosphatase tests.

Unit D—Milk Container Heated Directly

In this unit the timer started at from 45 to 56 minutes after the heat was turned on. Initial milk temperatures varied from 40° to 50° F. The period from the start of the timer until the buzzer sounded varied from 40 to 42 minutes. The air temperature above the milk surface below the cover at the start of the timer varied from 127° to 133° F. and the milk temperature varied from 136° to 143° F. The final air temperature was 147.3° F. with milk temperatures leveling off at 151.3° to 154° F. Occasional positive phosphatase tests were obtained on milk swabbed from the top inside rim when milk came in contact with the cover at the start of operation. Table 5 is a typical record of the temperatures recorded by thermocouples placed in the air under the cover and at two points in the milk. It also shows the results of phosphatase tests.

Table 5. *Temperature at various locations and phosphatase test on milk in automatic electric home pasteurizer—unit D (typical test)*

Heating time (minutes)	Temperature and location of thermocouple			Phosphatase test—Scharer units (N. Y. C. method)	
	Air below cover (°F.)	In milk			
		Surface (°F.)	Bottom (°F.)	I	II
0			43.0		
17	73.3	76.3	78.0		
33	94.0	93.0	101.0		
49	126.0	128.3	136.0		
53 [1]	132.8	136.0	143.0		
63	141.0	145.3	151.3		
79	146.3	149.6	153.6		
92 [2]	147.3	151.3	154.0	0	0
Swab of top edge of pail				<2	>3.5

[1] Timer indicating start of holding period.
[2] Buzzer indicating end of pasteurization.

837857—49——3

Other Methods of Heating Milk

Tests were also made on other recognized methods of heating milk in the home. These consisted of the use of an open aluminum vessel, a closed aluminum vessel and an aluminum double boiler. The milk container was the same inner container of the double boiler in all cases. This container was of about 2 quarts capacity and was filled only to the 1.5-quart mark in all tests. In the first test with the open aluminum container over direct heat and with stirring, 14 minutes were required to bring the temperature of the milk from 73° F. to between 163.4° and 167.8° F. After cooling by placing the vessel in cold water, a positive phosphatase test was obtained on the milk swabbed from the inner edge of the milk vessel. The positive phosphatase test indicates that the milk that comes in contact with the side of the vessel does not receive the same heat treatment as the main body of the milk. Table 6 shows the results obtained in a typical test by this method.

Table 6. *Temperature at various locations and phosphatase tests on milk heated in an open saucepan—direct heat, milk stirred (typical test)*

Heating time (minutes)	Temperature and location of thermocouples				Phosphatase test—Scharer units (N. Y. C. method)	
	Air above milk (° F.)	Pan rim above milk (° F.)	In milk			
			Surface (° F.)	Bottom (° F.)	I	II
0	66 2	59.0	62 6	58.1		
2	73 0	69 8	72.9	72.5		
4	79.2	84 2	90 1	88.7		
6	87.8	93 6	105 8	108.0		
8	89 6	115.2	120.2	122 9		
10	96.8	131.4	137.8	140 9		
12	111 2		152 6	154 4		
14	113 9		163.4	167.9		
Cooled 20	65.3		82.3	82.3	0	0
Swab of inner surface above milk					>2 0	>3.5

In order to observe the effect of a covered vessel at approximately the same temperature, the same container was used. After 18 minutes of heating, the temperature of the air under the cover was 154.8° F., the temperature of the rim was 158.4° F., and the milk temperature varied from 161.6° to 168.4° F. The phosphatase test on the main body of milk was negative, but the milk swabbed from the inner rim and top edge was positive by the N. Y. C. Method II, although to a lesser extent than in the open vessel test. Table 7 shows the results obtained in this test.

The method suggested by Trout (*10*) was used. Here the water in the bottom of the double boiler was brought to vigorous boiling and the milk container was placed in the outer container with the same heat

Table 7. *Temperature at various locations and phosphatase tests on milk heated in a covered saucepan—direct heat, no agitation (typical test)*

Heating time (minutes)	Temperature and location of thermocouples					Phosphatase test—Scharer units (N. Y. C. method)	
	Air above milk (° F.)	Pan rim above milk (° F.)	In milk				
			Bottom (° F.)	Center (° F.)	Top (° F.)	I	II
0	77.0	51.4	42.4	40.1	53.6		
4	65.8	55.0	52.2	53.2	49.1		
6	67.3	63.7	66.2	68.4	59.5		
8	72.0	73.8	77.9	78.1	69.4		
10	84.2	91.9	98.2	99.5	90.5		
12	100.4	110.1	114.8	116.2	113.0		
14	121.6	129.9	137.5	137.1	126.0		
16	140.9	148.5	156.9	159.8	148.6		
18	154.8	158.4	167.5	168.4	161.6		
Cooled 28	75.2	69.8	75.2	88.5	85.6	0	0
Swab of inner rim of container						<1	>2

applied to the outer vessel. In 10 minutes the temperature of the milk in the closed vessel varied from 168.8° to 192.6° F. and the air temperature below the cover was 178.7° F. There was a wide variation in the temperature of the milk because of the absence of agitation, but the lowest milk temperature was well above the temperature necessary to destroy phosphatase. Phosphatase tests on the main body of milk and on material swabbed from the inner side and edge of the vessel were all negative. Table 8 is a typical record of temperatures and phosphatase tests when using the double-boiler method of heating milk.

Table 8. *Temperature at various locations and phosphatase tests on milk in a double boiler—covered, over constantly boiling water, no agitation (typical test)*

Heating time (minutes)	Temperature and location of thermocouples				Phosphatase test—(Scharer units (N.Y.C. method)	
	Air below cover (° F.)	In milk				
		Bottom (° F.)	Center (° F.)	Top (° F.)	I	II
0	63.5	43.7	42.4	41.9		
2	72.5	73.4	52.7	59.0		
4	96.8	95.4	78.8	93.2		
6	124.2	130.6	113.9	125.2		
8	150.8	166.8	140.0	153.1		
10	178.7	192.6	168.8	178.7		
Cooled 18	95.0	60.8	72.5	93.2	0	0
Swab of inner surface above milk surface					0	0

Discussion

On the basis of the phosphatase test and thermocouple record of the minimum temperature obtained, the double boiler method proved to be satisfactory. Heating the milk to about 165° F. in an open or

closed vessel by direct heat did not produce a high enough temperature of the air or vessel surface above the milk surface line to inactivate phosphatase in milk that might contaminate this surface. There was, however, less phosphatase in the swabbed sample of milk from the closed vessel. In open vessels higher temperatures are required to compensate for the variation in temperature between the main body of milk and that milk contaminating the vessel above the milk surface line. In areas of higher elevation it may be necessary to hold the milk over boiling water for a longer period of time to compensate for the lower mean boiling point of water at higher elevations Stewart (7) published a table showing the mean boiling point of water at 5,000 feet to be 203° F., and at 15,000 feet to be 187° F.

With the home pasteurization units it is important to operate at temperatures sufficiently high to insure that the air and vessel surface above the milk surface line attains the desired temperature for the proper length of time. The positive phosphatase tests obtained on these surfaces, along with thermocouple recorded temperatures, show that this temperature-time combination is not always obtained by all of the home milk pasteurizers tested in this study.

In one experiment a positive phosphatase test was obtained on material swabbed from the vessel surface above the milk surface line when the thermocouple recorded temperature indicated heat treatment sufficient to reduce the phosphatase in the main body of the milk (table 2). This suggests that further study is needed on the relationship between temperature and phosphatase destruction in milk on this surface. The air temperatures recorded in table 2 are slightly higher than the milk temperatures in table 1, whereas the phosphatase test on the milk in table 1 is zero and the phosphatase test on material swabbed from the vessel surface in table 2 is slightly less than 2 units. A question arises relative to the possible requirement of higher temperatures for destruction of phosphatase in milk exposed to air or on surfaces above the milk surface line.

A study of the air and rim temperatures above the milk surface line in the units that have a definite holding period close to 30 minutes suggests a different time-temperature relationship for the destruction of phosphatase in swab samples from the different units.

Summary

The simplest method of satisfactorily heating milk in the home, to make it safe for consumption as fluid milk, is by the double boiler method. The temperature of heating, however, is not as well controlled; there is some precipitation of milk solids, and the milk may have a slightly cooked flavor.

Some of the automatic units should be operated at a higher temperature than has been suggested in the early literature There should be some way in which thermometers could be inserted into the milk so that the temperature can be checked. Most manufacturers of this equipment suggest that temperatures be checked with thermometers. This necessitates elevating the cover of the unit which has no opening for the thermometer, thus lowering the temperature of the air above the milk, and the inner rim of the vessel above the milk line.

A negative phosphatase test on the main body of the milk does not necessarily mean that the milk that may come in contact with the vessel rim above the milk surface line will also show a negative test. As demonstrated in unit B, table 3, this milk might contain living coliform organisms, even though those contained in the main body of the milk are killed.

As the minimum limits of time and temperature combinations for the pasteurization of milk are approached, more refinements in equipment construction and more accurate controls are needed to insure that all milk is held for the correct time at the proper temperature.

When the process is conducted on the same basis as that of heating other foods in the home, where higher temperatures are involved, simpler equipment such as the double boiler can be used

The use of the phosphatase test on material swabbed from the inner milk vessel surface above the milk level line is suggested as a check on proper heat treatment of milk that comes in contact with this surface during the pasteurization process.

Two solutions to the problem created by the absence of auxiliary methods for additional heating of the air above the milk level are:

1. Allow the heating water to completely surround the milk container. This will require tight-fitting nonporous covers that will not allow cooling water to enter the milk container.

2. Use higher temperatures which will insure that the milk vessel surface and the air above the milk level line will attain the proper temperature.

The manufacturers of units A and D have changed the construction of the tops of these units in order to raise the air temperature with the hope of overcoming the presence of active phosphatase in the milk swabbed from the vessel surfaces above the milk surface line. These units do not comply with the standards for commercial pasteurization, but when operated at temperatures that will insure proper heat treatment of the surface above the milk surface line, they compare favorably with the simpler double boiler methods of home milk pasteurization.

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Histoplasmosis in Rats and Skunks in Georgia

By C. W. Emmons, Ph. D., H. B. Morlan, B. S., and E. L. Hill, M. D.*

The occurrence of histoplasmosis in wild rats was first proved by the recent isolation of *Histoplasma capsulatum* from 10 brown rats (*Rattus norvegicus*) trapped in Loudoun County, Virginia (*3*). Subsequent studies (*2*) have brought the number of proved cases of murine histoplasmosis in that area to 27 and have indicated that the addition of the rat to the list of proved natural hosts of *Histoplasma* is of particular interest.

The significance of the rat in the epidemiology of histoplasmosis is not yet apparent, but the knowledge that it is a host of *Histoplasma* provides a useful tool for determining the geographic distribution of histoplasmosis. The rat is widely distributed over the earth, it is closely associated with man, and it can be collected in large numbers. Since the rat is susceptible to histoplasmosis under natural conditions, the procedure of making cultures from spleens and livers of a sufficient number of rats trapped in a given area may be expected to demonstrate the presence of histoplasmosis if it occurs in that area. Since proved human histoplasmosis is so infrequent, isolation of *Histoplasma* from rats or other animals (*4*, *7*) offers a direct method for obtaining information about the geographic distribution of this important disease.

Sporadic human cases of proved histoplasmosis have occurred in many parts of the world and it is reasonable to assume, therefore, in the absence of contrary evidence, that the disease has a very wide geographic distribution. Since histoplasmosis has been observed in many parts of the world, it is erroneous to assume that it has a limited "endemic" distribution in eastern central United States, unless it can be shown that the disease is actually unique to that area. The demonstration of histoplasmosis in the rat in an area such as Georgia, where autochthonous human histoplasmosis has not yet been reported, conclusively proves the presence in the area of *H. capsulatum*. It suggests that man is exposed to the pathogen and that human histoplasmosis may occur in Georgia although not previously recognized.

In an attempt to learn whether rats were infected with *Histoplasma* in geographic areas outside Loudoun County, Virginia (*4*), cultures were made from rats being collected for quite another purpose, i. e., typhus studies (*5*) in four counties in southern Georgia. During July

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and August, 1948, cultures were made from 288 rats collected in Decatur, Grady, Thomas, and Brooks Counties, Georgia. These counties lie in southwestern Georgia adjacent to the Georgia-Florida State line. The rats were taken from premises within regular trapping stations as well as from other premises selected to give a representative coverage of the four counties. They were identified as to place of capture by the carefully prepared grid pattern established for sampling the area.

Although the 288 rats of this first series came from premises distributed over the study area, they did not represent a random sample. They were selected from the total of rats examined for typhus and studied during July and August on the basis of size of animals, the availability of time of the local personnel required to make this additional study, and an approximately equal distribution of cultures among the four counties. Cultures for *Histoplasma* were made only from rats from which blood samples were obtained in sufficient volume to permit serologic examinations for both typhus and histoplasmosis.

Cultures were made from a second series of 474 animals between December 1 and December 15, 1948. This series included all animals trapped for typhus studies during the period with the exception of 25 animals which either had been bled and eviscerated before they were brought to the laboratory or were inadvertently missed. Besides the 474 animals, cultures were made from 90 animals of various species which were dead upon arrival at the laboratory and so were not

Animals examined for histoplasmosis (by culture)

Species	Brooks County		Thomas County		Grady County		Decatur County		Total	
	Number examined	Positive	Number examined	Positive	Number examined	Positive	Number examined	Positive	Number examined	Positive
First series:										
Rattus norvegicus (brown rat)	2	0	39	2	40	1	62	2	143	5
Rattus rattus (roof rat)	69	1	33	0	33	0	10	1	145	2
Second series:										
R. norvegicus	3	0	66	0	53	0	46	0	168	0
R. rattus	81	2	86	0	40	0	74	0	281	2
Spilogale putorius (spotted skunk)	0	0	1	1	0	0	2	2	3	3
Other species [1]	3	0	0	0	13	0	6	0	22	0
Third series:										
R. norvegicus	25	0	72	2	51	0	0	0	148	2
R. rattus	153	0	150	0	126	0	0	0	429	0
S. putorius	1	1	1	1	1	0	0	0	3	2
Other species [2]	0	0	4	0	45	0	0	0	49	0
Totals	337	4	452	6	402	1	200	5	1,391	16

[1] Includes 14 house mice (*Mus musculus*); two each of cotton rat (*Sigmodon hispidus*) and eastern cottontail (*Sylvilagus floridanus*): and one each of gray fox (*Urocyon cinereoargenteus floridanus*), cat squirrel (*Sciurus carolinensis*), fox squirrel (*S. niger niger*), and domestic cat (*Felis domestica*).

[2] Includes 39 cotton rats, 6 cotton mice (*Peromyscus gossypinus*) and one each of opposum (*Didelphis virginiana pigra*), raccoon (*Procyon lotor elucus*), fox squirrel and gray fox.

suitable for typhus studies. Those included 66 rats, 20 house mice, 2 cotton rats, 1 gray fox and 1 weasel. *Histoplasma* was not isolated from any of the latter animals and they will not be discussed further.

A third series was studied from February 10, 1949 to March 3, 1949, when cultures were made from 577 rats and 3 skunks taken for typhus studies from Grady, Thomas, and Brooks Counties. Typhus studies had been discontinued in Decatur County. Cultures were also made from 39 cotton rats, 6 cotton mice, 1 fox squirrel, 1 opposum, 1 raccoon, and 1 fox.[1]

The table shows the species of animals from which cultures were obtained, their distribution by counties, and the instances in which *Histoplasma* was isolated in culture. *R. norvegicus* and *R. rattus* were caught in greatest numbers and cultures were made from 288 rats in the first series (July–August 1948), 449 in the second (December 1948), and 577 in the third (February–March 1949). The numbers of other species were too small to be of great interest with the exception of the spotted skunk which will be referred to later.

Procedures

The animals were brought to the laboratory alive in cloth bags, and location of capture, species, sex, length and weight were recorded. The animal was anesthetized; the abdominal and thoracic cavities were opened, and the animal was bled by thrusting a sterile glass tube with capillary tip into the heart. Pieces of tissue were then taken with sterile instruments from spleen and liver for culture. A piece of spleen 0.1–1.0 cc. in size was streaked over the surface of a slant of modified Sabouraud's agar [2] and, in most cases, left near the top of the slant. The size of the piece of tissue varied with the size of the organ and from series to series. In general, larger pieces were used in cultures from the third series. A similar culture was made from the liver. These cultures were incubated at room temperature until a 30° incubator was available, in most cases after a lapse of 2 or 3 weeks.

Mycologic Studies

H. capsulatum was isolated from five specimens of *R. norvegicus* and two of *R. rattus* in the first series, from two specimens of *R. rattus* in the second series, and from two of *R. norvegicus* in the third, and from three specimens of the spotted skunk (*Spilogale putorius*) in the second and two of this animal in the third.

Although *Histoplasma* was isolated from 2.4 percent of the rats cultured in the first series, this incidence was not found in the two subsequent series. This discrepancy has not been satisfactorily

[1] Made available through the courtesy of E. V. Komarek.

[2] Difco neopeptone 1 percent, dextrose 2 percent, agar 2 percent

explained. It seemed possible that the selection of rats in the first series on the basis of size, as explained above, might have been a factor. When the rats of this series were segregated as to species and then divided into quartiles on the basis of increasing body length, the five infected Norway rats fell into the fourth quartile. However, in the case of the roof rat, one of the two infected rats fell into the fourth group and one fell into the second group. Both the infected roof rats in the second series fell into the second quartile of that series. One of the two infected Norway rats of the third series fell between the second and third, and the other between the third and fourth quartiles of their series. It is apparent, therefore, that histoplasmosis does not occur exclusively in old, large rats. It is possible that there is a seasonal variation in the incidence of histoplasmosis in the rat, but there is no clear indication of this in the data obtained to date in Virginia and Georgia.

Although the number of skunks is too small to draw conclusions about frequency of infection, it is interesting to note that *H. capsulatum* was isolated in culture from all of three skunks (*S. putorius*) trapped in three widely separated locations in the study area in December and from two of three specimens of this animal trapped on other farm premises in February. This appears to indicate a high incidence of histoplasmosis in the skunk. It should be recalled that several other species of small mammals have been unsuccessfully examined for histoplasmosis (*4*).

Macroconidia [3] representing the saprophytic growth phase of *Histoplasma capsulatum* have been demonstrated recently in soil (*1*). It might be assumed that the ground-dwelling animals are exposed to a more or less equal extent to any fungi growing in the surface layers of soil. However, the extent of the growth of *Histoplasma* in soil and the factors influencing the relative degree of exposure among ground-dwelling animals are not known.

All strains of *H. capsulatum* isolated from rats and skunks in Georgia were alike in appearance and virulence. The gross colony characteristics of the 16 Georgia strains are typical of the species. Growth rate is slow, the color is white in the young colony and becomes yellowish to brown in old cultures. These strains differed from most others we have studied in the paucity of macroconidia and the abundance of microconidia. Typical macroconidia with finger-like appendages covering the walls have been found in all Georgia strains (fig. 1), but they are found infrequently or not at all in many subcultures. However, there are enormous numbers of small conidia in all strains (fig. 2). These are typical of those seen, usually in much fewer numbers, in other strains of *H. capsulatum*. They are nearly sessile to

[3] For a discussion of terminology of *Histoplasma* spores see Emmons (*1*).

stipitate, 2–4μ in diameter, with walls which are smooth or slightly roughened to spiny The presence of large numbers of these microconidia and the near lack of macroconidia in these Georgia strains

Figure 1 Macroconidia and microconidia of a strain of *H capsulatum* isolated from a Georgia rat (×1000)

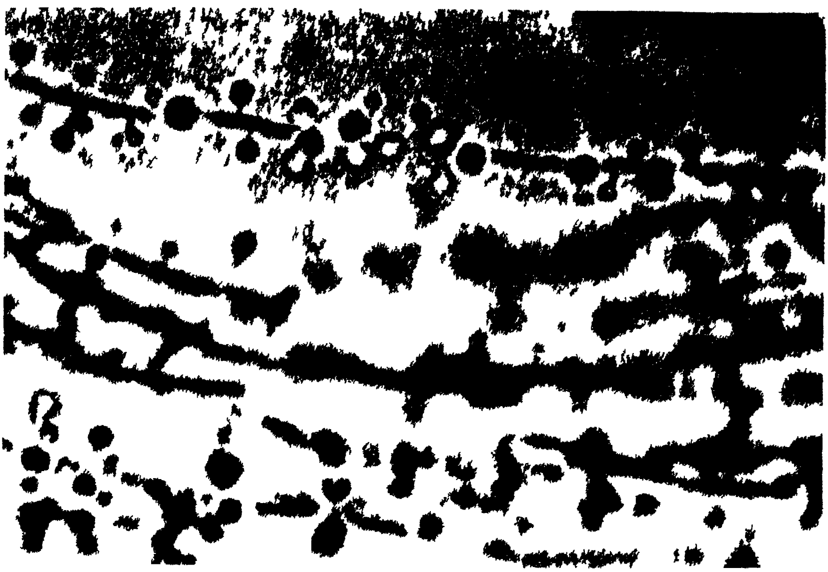

Figure 2. Abundant production of microconidia typical of Georgia rat strains of *H capsulatum* (×1000)

makes their resemblance to cultures of *Blastomyces dermatitidis* and *Haplosporangium parvum* even greater than in most strains of *H. capsulatum*.

The production of such large numbers of small conidia is a striking feature, and it is particularly interesting that it should characterize all the Georgia strains so far seen. It cannot be considered a characteristic peculiar to strains of rodent origin, because the strains isolated from rats in Virginia bore typical macroconidia and were like strains of human origin in all observed respects. The senior author has observed numerous small conidia in one strain isolated from a cat and in a few strains from human histoplasmosis, and this characteristic sometimes appears as a transitory character in other strains carried in culture in the laboratory.

These strains from animals collected in Georgia appear to be like the strain of *H. capsulatum* isolated from the first case of South American histoplasmosis. Negroni (*6*) described this strain as characterized by the production of large numbers of small spores which he called conidia, and less numerous large spores which he called hypnospores. He noted that both types of spores might be either smooth or rough-walled. The surface markings in the small spores were described as pits, and in the large spores the familiar finger-like appendages were described and illustrated although considerable variation in the size and shape of these surface markings was noted.

Tissues were saved from only a few animals in these studies and the histopathology in these naturally infected rats from Georgia is not known. However, the 16 Georgia strains of *Histoplasma* have been tested for pathogenicity. Mice inoculated intraperitoneally with suspensions of conidia died within 3–5 weeks. The rapidly fatal development of experimental histoplasmosis does not necessarily indicate greater virulence of the Georgia strains. It seems to be related, rather, to the very numerous microconidia produced by these strains and the relative ease with which an inoculum containing a large number of infective elements can be prepared. Experimentally infected mice showed typical lesions of fatal histoplasmosis with enormously enlarged spleens and livers and peritonitis with accumulation of straw-colored fluid in the peritoneal cavity (fig. 3). Impression smears of liver and spleen reveal large numbers of *Histoplasma* cells which are typical of those previously seen and described in man, in the dog, and in experimentally infected animals (fig. 4). All strains were re-isolated from experimentally infected mice in the yeast-like form on blood agar.

Serologic Studies

A portion of the serum from each of the 286 rats in the first series was examined for complement-fixing antibodies by S. B. Salvin (*8*). The results were not informative. No fixation in the presence of

Histoplasma yeast phase antigen was observed in any of the seven rats in this series from which *Histoplasma* was isolated No sera from rats in the second and third series were tested for fungus antibodies.

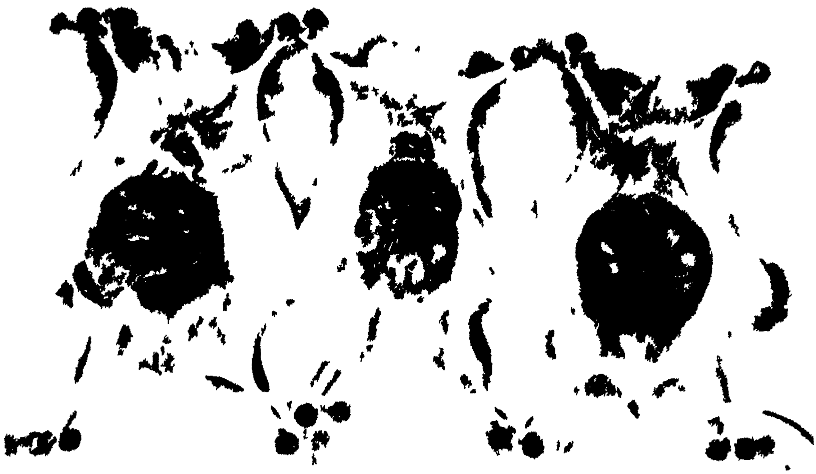

Figure 3. Mice infected with Georgia strains of *H. capsulatum*.

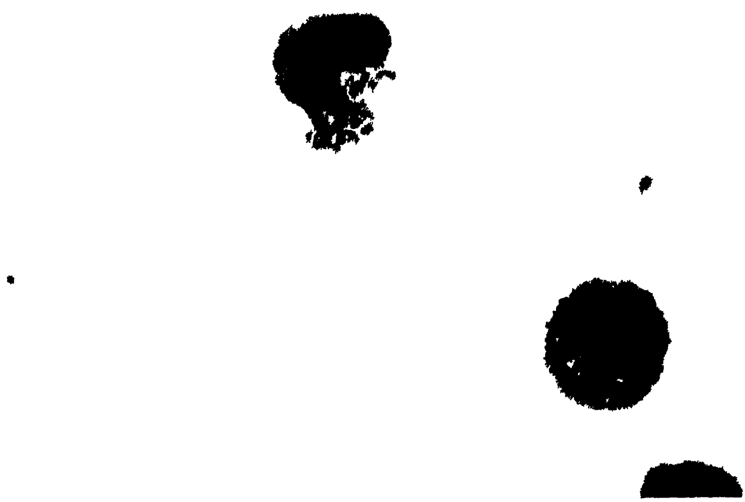

Figure 4. *H. capsulatum* in an impression smear of spleen from a mouse infected with a Georgia strain (×1000).

Discussion

This report adds two new animal species (*Rattus rattus* and *Spilogale putorius*) to the list of natural hosts of *Histoplasma* and extends the geographical limits of the known occurrence of histoplasmosis in the brown rat. No significant relationship between human and animal histoplasmosis has yet been observed. We have not been able to find any record of proved human histoplasmosis known to have been acquired in Georgia, but the isolation of *H. capsulatum* from animals in this area proves conclusively that the pathogen is present as a potential hazard.

The implications of the demonstration of *Histoplasma* in an area usually considered far beyond the limits of the area of high incidence of histoplasmin sensitivity and nontuberculous calcification will be discussed in a subsequent report.

Summary

H. capsulatum was isolated from seven brown rats (*R. norvegicus*), four roof rats (*R. rattus*) and five spotted skunks (*S. putorius*) in southwestern Georgia.

These 16 strains resemble each other but differ from most strains of human, canine, and rodent origin in the paucity of macroconidia and great abundance of microconidia. They are pathogenic for mice, and all have been re-isolated from experimentally infected mice on blood agar in the typical yeast-like form of growth.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 22, 1949

The reported incidence of poliomyelitis declined only slightly during the current week—from 1,207 cases last week to 1,148, a decrease of about 5 percent, as compared with nearly 24 percent last week. Figures for the corresponding week last year and the 5-year (1944–48) median are 1,078 and 722, respectively. Increases totaling 52 cases were recorded in the West North Central, West South Central, and Pacific areas. Of 25 States reporting a combined increase of 158 cases, 5 (Wisconsin, Minnesota, Missouri, Texas, and California) showed increases of from 17 to 24 cases each. States reporting currently more than 18 cases and showing increases are as follows (last week's figures in parentheses): Massachusetts 51 (50), Pennsylvania 36 (33), Ohio 52 (47), Wisconsin 43 (26), Minnesota 40 (23), Missouri 50 (27), Nebraska 24 (21), Arkansas 22 (9), Oklahoma 31 (29), Texas 57 (36), Utah 22 (19), California 98 (74).

The total for the year to date is 37,087 cases, as compared with 22,588 for the same period last year and a 5-year median of 16,856. Percentages, by geographic divisions, of the 36,171 cases reported since March 19 (same period last year 22,238) are as follows (corresponding percentages last year in parentheses): New England 8.5 (1.6), Middle Atlantic 18.9 (11.4), East North Central 24.1 (15.7), West North Central 16.2 (17.3), South Atlantic 4.4 (18.4), East South Central 4.3 (3.8), West South Central 11.9 (9.7), Mountain 4.8 (2.7), Pacific 6.9 (19.4).

During the week, 1 case of anthrax was reported in Pennsylvania, and 1 case of leprosy in California. Of the other diseases reported in the table, current figures are slightly above the corresponding medians for meningococcal meningitis, infectious encephalitis, Rocky Mountain spotted fever, and tularemia.

A total of 8,887 deaths was recorded during the week in 94 large cities in the United States, as compared with 8,750 last week, 8,974 and 8,721, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,785. The total for the year to date is 384,513, as compared with 385,943 for the corresponding period last year. Infant deaths totaled 644, last week 668, corersponding week last year 701, 3-year median 704. The cumulative figure is 27,495, same period last year 28,066.

Telegraphic case reports from State health officers for the week ended Oct. 22, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	----	----	----	23	----	10	10	----	6	----	----	----	10	----
New Hampshire	----	----	----	1	----	----	1	----	2	----	----	----	----	----
Vermont	----	----	----	2	----	----	5	----	2	----	----	----	1	----
Massachusetts	5	1	----	35	2	----	51	----	32	----	1	1	54	----
Rhode Island	----	----	----	1	----	2	5	----	1	----	----	----	7	----
Connecticut	1	----	----	13	1	28	17	----	3	----	----	----	40	----
MIDDLE ATLANTIC														
New York	6	----	(c)	75	4	162	138	----	d 48	----	----	2	166	17
New Jersey	----	----	2	27	1	65	58	----	12	----	----	1	129	1
Pennsylvania	8	----	----	61	2	29	36	----	19	----	----	1	155	----
EAST NORTH CENTRAL														
Ohio	5	----	----	15	8	53	52	----	86	----	----	1	73	6
Indiana	4	1	----	8	1	2	22	----	14	----	----	----	22	7
Illinois	1	1	----	14	4	69	63	----	23	----	----	2	92	1
Michigan [a]	5	----	----	50	5	39	[1] 67	----	34	----	----	----	87	----
Wisconsin	----	----	5	59	1	3	43	----	16	----	----	----	64	1
WEST NORTH CENTRAL														
Minnesota	1	2	----	5	2	3	40	----	16	----	----	1	1	----
Iowa	----	----	----	10	1	----	15	----	10	----	----	----	4	5
Missouri	2	----	----	2	1	11	50	----	11	----	4	6	9	----
North Dakota	----	----	1	3	1	----	2	----	1	----	----	----	----	----
South Dakota	----	----	----	1	----	1	7	----	d 2	----	----	----	8	----
Nebraska	1	----	4	3	----	----	24	----	4	----	----	----	4	----
Kansas	3	----	----	1	2	13	23	----	12	----	----	2	2	----
SOUTH ATLANTIC														
Delaware	1	----	----	1	----	----	4	----	5	----	----	----	33	----
Maryland [a]	2	----	----	6	----	7	14	1	7	----	----	1	40	----
District of Columbia	----	----	----	3	----	8	3	----	3	----	----	----	----	----
Virginia	7	1	160	9	----	35	13	1	14	----	----	9	19	2
West Virginia	10	----	----	7	2	7	7	----	15	----	----	1	38	----
North Carolina	28	1	----	20	----	----	6	1	87	----	----	2	24	----
South Carolina	14	----	8	----	12	7	----	----	4	----	----	9	7	2
Georgia	17	----	13	----	----	10	[1] 10	1	14	----	----	1	3	7
Florida	7	----	----	4	----	15	3	----	7	----	1	----	4	2

EAST SOUTH CENTRAL														
Kentucky	16				4	1	18		73			1	40	16
Tennessee	7		12	7	4	43	15		56			2	8	
Alabama	6		35	2	3	16	1	1	20				9	8
Mississippi [a]	9		4	1		22	9		7		1	3	11	
WEST SOUTH CENTRAL														
Arkansas	7		42	1	2	22	[1] 22		1		5	4	9	
Louisiana	5			1		1	5		5		1		4	
Oklahoma	2	1	7	1	1	7	31		6		1		1	3
Texas	34	2	783	17	5	215	57		15		1	7	52	16
MOUNTAIN														
Montana			4	32	1		5		3					
Idaho			25	6		9	18		[d] 25				7	
Wyoming	1			4			2							
Colorado		2	26	3	1	17	13		2				6	
New Mexico			1	12		11	9	1	7			2	3	
Arizona			110	46		8	1		2			4	10	
Utah [a]	2		2		1	2	22				1		7	
Nevada				1	1				1					
PACIFIC														
Washington	1		21	28		1	18		35				6	
Oregon	4		11	15	1	13	15		7				7	
California	7	3	9	38	5	23	98		[d] 52			9	93	1
Total	229	15	1,285	674	70	990	1,148	6	827		16	75	1,369	
Median, 1944–48	385	14	1,688	922	62		722	2	1,386	3	10	100	1,539	
Year to date, 42 weeks	5,965	647	85,224	592,324	2,775	63,755	[1] 37,087	547	63,053	44	951	3,168	50,780	
Median, 1944–48	9,720	529	200,048	558,200	5,002		16,856	506	94,441	295	761	3,464	80,438	
Seasonal low week ends	(27th) July 9		(30th) July 30	(35th) Sept. 3	(37th) Sept. 17		(11th) Mar. 19		(32d) Aug. 13	(35th) Sept. 3		(11th) Mar. 19	(39th) Oct. 1	
Since seasonal low week	2,197		9,357	3,806	259		[1] 36,171		4,793	3		2,708	4,178	
Median, 1944–45 to 1948–49 [b]	3,885		10,219	4,647	336		16,593		8,146	21		2,989	4,563	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods (1944–45 to 1948–49).
[c] New York City only.
[d] Includes cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately as follows: New Jersey 1, Virginia 1, Texas 1, California 8. Cases reported as salmonella infection, not included in the table, were as follows: Massachusetts 7, New York 2.
[1] Poliomyelitis—Deductions: Michigan, weeks ended September 3, and 24, 1 case each; Georgia, week ended October 1, 1 case; Arkansas, week ended October 1, 1 case.

Anthrax: Pennsylvania, 1 case.
Leprosy: California, 1 case.
Alaska: Measles 54, pneumonia 1, scarlet fever 2.
Hawaii Territory: Poliomyelitis 1, whooping cough 1.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended October 1, 1949.—During the week ended October 1, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	New-foundland	Prince Edward Island	Nova Scotia	New Bruns-wick	Que-bec	On-tario	Mani-toba	Sas-katch-ewan	Alber-ta	Brit-ish Co-lum-bia	Total
Chickenpox	1		17	3	57	56	5	14	31	46	230
Diphtheria			1		3	3	1				8
Dysentery, bacillary					12	4					16
Encephalitis, infectious							3				3
German measles			1			6			23	12	42
Influenza			7			14	3				24
Measles	1		34		59	42	11	35	33	120	335
Meningitis, meningococcal					1	1					2
Mumps			8		31	79	3	6	2	55	184
Poliomyelitis	5		4	1	12	30	12	3	6	6	79
Scarlet fever	2		1	1	26	27	6	1	10	4	78
Tuberculosis (all forms)	13			5	159	23	21	6		57	284
Typhoid and paratyphoid fever	1				16	6			3	2	28
Undulant fever									1		1
Venereal diseases:											
Gonorrhea	17	3	8	16	83	87	30	17	44	83	388
Syphilis	5		19	5	56	23	13	10	4	38	173
Other forms										1	1
Whooping cough	1			1	98	49	5	12	2	5	173

CUBA

Habana—Notifiable diseases—4 weeks ended August 27, 1949.—During the 4 weeks ended August 27, 1949, certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	9		Tuberculosis	7	2
Leptospirosis	1		Typhoid fever	27	1
Measles	1	1	Undulant fever	1	

Provinces—Notifiable diseases—4 weeks ended August 27, 1949.—During the 4 weeks ended August 27, 1949, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	4	8	12	23	1	15	63
Chickenpox						1	1
Diphtheria		10	6	1	1	3	21
Leprosy		7				1	8
Malaria	3	2	2	1	7	19	34
Measles		3	7		3		13
Poliomyelitis	1	1			1	1	4
Tetanus					1		1
Tuberculosis	6	18	13	47	2	18	104
Typhoid fever	14	46	9	15	16	43	143
Undulant fever		1				3	4
Whooping Cough					1		1

[1] Includes the city of Habana.

JAMAICA

Notifiable diseases—5 weeks ended October 1, 1949.—For the 5 weeks ended October 1, 1949, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Poliomyelitis		1
Chickenpox	7	15	Puerperal sepsis		1
Diphtheria	2	6	Scarlet fever		1
Dysentery, unspecified	1	1	Tuberculosis (pulmonary)	38	63
Erysipelas	1	2	Typhoid fever	2	51
Leprosy		3	Typhus fever (murine)	1	

NORWAY

Notifiable diseases—July 1949.—During the month of July 1949, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	7	Paratyphoid fever	3
Diphtheria	21	Pneumonia (all forms)	1,301
Erysipelas	316	Poliomyelitis	7
Gastroenteritis	3,625	Rheumatic fever	82
Gonorrhea	237	Scabies	823
Hepatitis, epidemic	80	Scarlet fever	249
Impetigo contagiosa	1,539	Syphilis	49
Influenza	975	Tetanus	1
Laryngitis	5,430	Tuberculosis (all forms)	295
Malaria	1	Typhoid fever	1
Measles	1,337	Whooping cough	3,529
Mumps	247		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Peru.—During the period September 1–30, 1949, plague was reported in Peru as follows: At Barraza Farm, Trujillo Province, Libertad Department, 1 case; at St. Nicholas Farm, Chancay Province, Lima Department, 1 case.

Union of South Africa.—Plague has been reported in Union of South Africa as follows: In Cape Province—week ended October 1, 1949, 1 case at Witwater Farm, Kuruman District, week ended October 8, 1 death at Clapin Farm, Kuruman District, 1 case in Olifantshoek Municipal Location; in Orange Free State—week ended October 1, 1 death (suspected plague) at Aloe Farm, Heilbron District, week ended October 8, 1 death (pneumonic plague, suspected) at Twyfelfontein Farm, Ladybrand District.

Smallpox

French West Africa—Ivory Coast.—For the period September 21–30, 1949, 41 cases of smallpox, with 15 deaths, were reported in Ivory Coast, French West Africa.

Mexico.—During the week ended September 17, 1949, 34 cases of smallpox were reported in Mexico, of which 29 cases occurred in Otzoloapan, Mexico State.

Union of South Africa—Transvaal.—Smallpox has been reported in Transvaal, Union of South Africa, as follows: May 1–31, 1949, 94 cases; June 1–30, 166 cases, 20 deaths; July 1–31, 145 cases, 6 deaths.

Typhus Fever

Portugal.—During the month of June 1949, 1 death from typhus fever was reported in Aveiro District, Portugal, and during the month of July, 1 death from this disease was reported in Braga District.

Spain—Madrid.—During the week ended September 3, 1949, 1 case of typhus fever was reported in the city of Madrid, Spain.

Union of South Africa.—During the period May 1–July 31, 1949, 42 cases of typhus fever were reported in Union of South Africa, distributed as follows: May 1–31, Cape Province 12 cases, Natal 4 cases, Transvaal 1 case; June 1–30, Cape Province 8 cases, Natal 1 case; July 1–31, Cape Province 7 cases, Natal 8 cases, Transvaal 1 case.

DEATHS DURING WEEK ENDED OCT. 22, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Oct. 22, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,887	8,974
Median for 3 prior years	8,785	
Total deaths, first 42 weeks of year	384,513	385,943
Deaths under 1 year of age	644	701
Median for 3 prior years	704	
Deaths under 1 year of age, first 42 weeks of year	27,495	28,066
Data from industrial insurance companies:		
Policies in force	70,102,189	70,838,716
Number of death claims	12,171	12,861
Death claims per 1,000 policies in force, annual rate	9.1	9.5
Death claims per 1,000 policies, first 42 weeks of year, annual rate	9.1	9.3

QUARANTINE PROVISIONS OF IRELAND

The Government of Ireland has pointed out that vaccination against smallpox is not required of persons entering Ireland. However, that country has a provision that persons coming from known smallpox areas may be required to submit to quarantine or other restrictions if they do not possess vaccination certificates.

The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $1.00 a year.

Public Health Reports

VOLUME 64 NOVEMBER 18, 1949 NUMBER 46

IN THIS ISSUE

Statistical Studies of Heart Disease, V

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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CONTENTS

	Page
Statistical studies of heart disease. V. Illness from heart and other cardiovascular-renal diseases recorded in general morbidity surveys of families. Selwyn D. Collins	1439
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended October 29, 1949	1493
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended October 8, 1949	1496
Japan—Notifiable diseases—4 weeks ended September 24, 1949, and accumulated totals for the year to date	1496
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Plague	1497
Smallpox	1497
Typhus fever	1497
Yellow fever	1497
Deaths during week ended October 29, 1949	1498

Public Health Reports

Vol. 64 • NOVEMBER 18, 1949 • *No. 46*

Statistical Studies of Heart Disease

V. Illness from Heart and Other Cardiovascular-renal Diseases Recorded in General Morbidity Surveys of Families

By Selwyn D. Collins, Ph. D.*

Heart disease, the largest single category in the cardiovascular-renal [1] diseases, is by far the most frequent of all causes of death. Hypertension and arteriosclerosis rank low as recorded primary causes of death in the United States, but intracranial lesions of vascular origin, usually preceded by hypertension or arteriosclerosis or both, are important causes of death. Nephritis in terms of numbers of deaths is roughly equivalent to intracranial lesions. The three causes combined under the general title of cardiovascular-renal diseases, made up 48 percent of all deaths in the United States in the 2 years, 1945 and 1946. These causes accounted for 10 percent of all deaths at 15–24 years; 30 percent at 35–44; 52 percent at 55–64; and 66 percent at 75–84 years of age. Thus in the older ages they constitute a very large proportion of the deaths from all causes.

At least three criteria measure the importance of a given disease as a cause of morbidity—annual cases or attacks per 1,000 persons observed, annual days of disability [2] per person observed, and days of disability per sick person. In terms of cases or attacks of illness, both disabling and nondisabling, the cardiovascular-renal diseases are

*Head Statistician, Division of Public Health Methods, Public Health Service. This series of papers dealing with the statistics of heart disease morbidity and mortality is the result of a joint study undertaken by the Division of Public Health Methods and the National Office of Vital Statistics and is now being financed in part by the National Heart Institute.

[1] Cardiovascular-renal as used here refers to (*a*) heart disease, all forms except syphilitic and thyrotoxic; congenital is included with heart disease except in tables and charts noted to the contrary; (*b*) hypertension including intracranial lesions of vascular origin, high blood pressure, and arteriosclerosis; (*c*) nephritis, all forms, and other kidney diseases. While not an exact classification, it seemed the best that could be done with the available survey data.

[2] Disability as used throughout this paper means inability to: work in gainful employment or at home, do housework, attend school, or pursue other usual activities. Cases with any disability include those with intermittent disabilities of less than 7 consecutive days, but the majority of the disabling cases were disabled for 7 consecutive days or longer. The disabling category includes hospital cases and deaths before the 7th day of disability. See footnotes to table 1 for a detailed description of disability categories used in this study.

outstripped by the acute upper respiratory diseases. Because of the very large number of the latter cases, this respiratory group usually accounts for more days of disability per person under observation than do the cardiovascular-renal diseases, although at some of the older ages heart disease is the leading cause of disability in terms of days per person observed. In terms of days of disability per sick person, the cardiovascular-renal diseases rank high because of long durations. Heart disease is the most important of the cardiovascular-renal group.

In these diseases, as in other chronic and some acute conditions, an almost unmeasurable number of minor cases is unknown to the patient or to the family informant.

Data on mortality from heart disease are available in detailed classifications by the particular type of heart disease and by age, sex, geographic section, size of city, rural area, and other important classifications not only in the United States but also in many other countries. Data on illness from heart disease, however, are far less complete and usually far less detailed. Almost the only attempt to record heart disease morbidity in the United States on anything like a national scale was made in the National Health Survey of 1935–36. For various reasons the data from that survey were not analyzed in detail with respect to specific chronic diseases. Although the data pertain to a period more than a decade ago, it seems worth while to report more completely the results of that study in comparison with data collected in other ways.

Source and Character of Data

The National Health Survey (*2*, *14*, *17*) consisted of a single-visit house-to-house canvass conducted in 83 cities and towns in 18 States by different groups of personnel in each city but with careful supervision from a national headquarters as well as general and immediate supervision from regional, State, and local offices. Even under these circumstances, a single canvass with inquiries about the whole of the preceding year would not record all illness. However, more complete data could be expected for disabling chronic diseases in the cardiovascular-renal group because of their long duration and the considerable disability associated with them.

Data were recorded in the terms reported by the informant, who was usually the housewife, or, in her absence, some other responsible adult member of the household. However, a large subsample of the diagnoses was sent to attending physicians, clinics, and hospitals for verification. The general results of this procedure are presented in some detail in the appendix to this paper.

The morbidity data were supplemented by mortality recorded for

the surveyed group in the study year 1935–36, and for the continental United States registered for the years 1936 and 1945–46, the last final reports that were available.

Selection of the Main Sample

The selection of the cities and of the enumeration districts within the cities which were canvassed are discussed in detail in a prior publication (*14*). Briefly, the survey covered approximately 700,000 households in 83 cities and towns as small as 5,000 in population. The total surveyed population was distributed roughly as the total population of the United States with respect to broad geographic sections and size of city. The 52 cities under 100,000 were, with one exception, completely canvassed, but those over 100,000 had differing sampling ratios. The sample areas were United States census enumeration districts selected by a random process from the total of such districts in the city. Enumeration districts range from 1,000 to 3,000 or more population, but for this survey districts of 2,000 to 3,000 were subdivided into two parts, and those with 3,000 or more population were subdivided into three parts, each part being considered as a separate district in selecting the areas to be canvassed.

Total Cases of the Several Types

Table 1 shows for each of the three diagnoses and for the total cardiovascular-renal diseases the case rates per 100,000 surveyed population, the percentage of cases attended by a doctor during the study year, and the total number of cases recorded. The total cases for heart disease refer to all persons for whom a diagnosis of heart disease of any type was reported, regardless of what other diseases or complications the patient suffered during the year. However, each case of heart disease represents a different individual; the relatively few second or later attacks for the same person during the year were eliminated.[3] Thus the different types of cases and rates are additive to obtain total case rates with any disability and total recorded cases.

The same is true of the hypertension group, and of nephritis; however, the cases of the three diseases are not additive to the total cardiovascular-renal cases because a patient with heart disease may also have had hypertension or nephritis or both. In the columns labeled "cardiovascular-renal diseases", cases in which the same individual had two or more of the three diseases are included only once. Cases involving heart disease, hypertension, or nephritis complicated by some diagnosis other than one of these three are all included, regardless of the relative importance of the other diagnosis involved.

Of the total cardiovascular-renal cases with disability of 7 con-

[3] Second and later attacks for the same individual during the study year amounted to heart, 253 cases; hypertension, 104 cases; and nephritis, 88 cases; with a cardiovascular-renal unduplicated total of 393 cases. The 20 heart deaths and 11 hypertension deaths among these cases were retained as fatal cases.

Table 1. *Cases of heart disease, hypertension, nephritis, and cardiovascular-renal diseases classified by onset and disability—2,500,000 persons of all ages in 83 cities and towns in 18 States, 1935–36*

Description of case [1]	Cases per 100,000 persons observed				Percent of cases attended by a doctor [3]				Total number of cases			
	Heart disease	Hyper-tension	Neph-ritis	Cardio-vascular-renal	Heart disease	Hyper-tension	Neph-ritis	Cardio-vascular-renal	Heart disease	Hyper-tension	Neph-ritis	Cardio-vascular-renal
Total with any disability during year	913	722	322	1,638	90.8	92.6	89.4	90.4	22,699	17,957	8,011	40,719
Onset [2] within study year and disabled 7+ days	507	419	218	964	95.7	97.1	93.8	95.5	12,607	10,428	5,417	23,972
No previous attack (new cases)	251	237	118	518	96.1	97.6	95.2	96.2	6,237	5,886	2,943	12,877
Previous attack (recurrences)	256	183	99	446	95.3	96.5	92.1	94.6	6,370	4,542	2,474	11,095
Onset [2] prior but disabled during year	406	303	104	673	84.7	86.4	80.1	83.1	10,092	7,529	2,594	16,747
Disabled 7 or more consecutive days	212	149	60	335	91.2	92.2	90.5	90.2	5,264	3,712	1,487	8,329
Intermittent less than 7 consecutive days	194	154	45	339	77.6	80.7	66.0	76.1	4,828	3,817	1,107	8,418
Nondisabling residuals of previous cases	997	1,155	275	2,132	51.4	54.7	41.5	49.9	24,791	28,716	6,839	53,014
With restriction of activity during year	248	198	49	416	60.4	65.5	50.9	59.2	6,166	4,913	1,228	10,344
Without restriction of activity during year	749	957	226	1,716	48.4	52.4	39.4	47.7	18,625	23,803	5,611	42,670
Total with any disability or restriction	1,161	920	372	2,054	84.3	86.8	84.2	84.1	28,865	22,870	9,239	51,063
Total recorded cases of any kind [4]	1,910	1,877	597	3,769	70.2	69.3	67.3	67.5	47,490	46,673	14,850	93,733

[1] Cases of each of the 3 broad diagnoses include that diagnosis as a sole, primary, or contributory cause. Duplicate attacks of the same disease in the same individual during the study year are excluded, so that each case represents a different individual. The total for cardiovascular-renal diseases is the total of the 3 diseases minus cases representing a second or third disease (of the 3 herein considered) in the same individual.

[2] Onset refers to the date of beginning of disability due to this attack. Disability means inability to attend school, work in gainful employment or at home, or pursue other usual activities. Cases with onset within the study year were nearly all disabled for 7 consecutive days or longer but this category includes deaths before the 7th day, hospital cases, and a few cases disabled on the day of the visit who had not been disabled for 7 consecutive days. This category also includes some cases with an unknown number of days disabled (less than 1 percent in each diagnosis) that were excluded from tables 9 and 10 which deal with mean disabling durations and distributions of cases by duration.

[3] For disabling illness (except intermittent), attendance refers to a doctor during that attack; for nondisabling and intermittent cases attendance refers to a doctor within the study year. Hospital inpatients with care by the hospital staff only are included here as attended, but are not counted in table 13 as having home, office, or clinic calls.

[4] Following is a description of the specific types of cases used in this and other tables:

I. Serious disability: Cases disabling for 7 consecutive days or longer, including deaths before the 7th day, hospital cases disabled less than 7 days and cases disabled on the day of the visit with less than 7 days of disability.
 (1) New cases: Disability of 7 consecutive days or longer with onset of disability within the study year and no history of any previous attack.
 (2) Recurrent cases: Disability of 7 consecutive days or longer with onset of disability within the study year but with a history of one or more attacks (disabling or nondisabling) prior to the study year.
 (3) Onset prior: Disabled at beginning of study year with further disability of 7 consecutive days or longer within the study year.

II. Disability of less than 7 consecutive days:
 (4) Intermittent disability: Cases with no disabling attack of 7 consecutive days or longer during the study year but with 1 or more disabling attacks of less than 7 consecutive days; the aggregate days of disability from such attacks is sometimes fairly large.

III. Nondisabling:
 (5) Restricted activity: Cases with no disability but some restriction of activity such as ability to do light work only or nonparticipation in athletics.
 (6) Nondisabling: Cases with no disability and no restriction of activity at any time during study year

secutive days or longer, 94 percent were attended by a doctor; corresponding figures for the three diagnoses were 94, 96, and 93 percent for heart disease, hypertension, and nephritis, respectively. Nearly half (48 percent) of the cardiovascular-renal nondisabling[4] cases with no restriction of activity had seen a doctor within a year, and of the nondisabling with some restriction of activity, 59 percent had seen a doctor within that time. It seems probable, therefore, that most of the cases recorded in this study involved a period of severe illness either during or preceding the study year, rather than a physical examination finding without disabling illness.

The cardiovascular-renal cases which suffered 7 or more consecutive days of disability during the year (average 126 days per case) were probably recorded with reasonable completeness. Evidence of this fact is found by comparing the survey rates of 7 days or more disability for males with the findings of Gafafer (*9*) for cases disabling 8 days or longer among members of industrial sick benefit associations. Gafafer's data for the years 1940–46, represent nearly 500,000 male-years of membership for working people of roughly 20–64 years of age, with a few below and above those ages. In the household survey, the heart disease attack rate (exclusive of any overlap with the other two diagnoses) with onset of disability within the study year was 397 cases per 100,000 for males 20–64 years, as compared with 455 for the sick benefit associations. Corresponding figures for hypertension were 212 for the canvass group and 168 for sick benefit members, and for nephritis, 166 as compared with 128 per 100,000 sick benefit members. For the total cardiovascular-renal group the canvass rate was 774 cases per 100,000 males as compared with 751 for sick benefit members. The rates in the two sets of data are of the same order of magnitude and actually higher for the hypertension group and nephritis. The canvassed population, however, would include the chronically disabled and might be expected to have higher rates than the working population.[5]

Nondisabling cases in the household canvass were obtained by an inquiry about a considerable number of specific chronic diseases in which a record was made of the presence of the disease regardless of disability. Such a record, however, would miss many cases that would

---

4 Of the total heart cases that were either nondisabling or had only intermittent disabilities of less than 7 consecutive days, 4.5 percent (1,059 nondisabling and 233 intermittent) reported the total duration of the disease was less than 12 months. Corresponding figures were 5.7 percent (1,652 nondisabling and 187 intermittent) for hypertension; 5.4 percent (366 nondisabling and 64 intermittent) for nephritis; and 5.1 percent (2,678 nondisabling and 441 intermittent) for the total cardiovascular-renal group. These cases with little or no disability were not counted with the new cases because they did not represent an attack in the sense of the new 7-day disabling cases. For further data on inclusions in each disability category, see footnotes to table 1, and for further data on total durations of symptoms, see table 12, section 2.

5 Average durations in days of disability per case for males 20–64 years of age in the canvassed families were 136, 127, 91, and 122 for heart, hypertension, nephritis, and the whole cardiovascular-renal group, respectively, as compared with 107, 99, 56, and 96 among the members of sick benefit associations.

be recorded by even a superficial examination with a stethoscope or sphygmomanometer, not to mention the use of an electrocardiograph. Indeed, heart disease and hypertension are frequently found on examination of individuals who had no knowledge that they had such conditions.[6]

Throughout this report the data are presented as recorded, without correction of any kind. The appendix, however, includes a discussion of methods of correcting for under-reporting and rough estimates of total cases in the United States at the present time.

Relative Importance of Each Diagnosis in the Cardiovascular-Renal Case Load

As already noted, the method of counting and tabulating included as a heart disease case, for example, any individual for whom such a diagnosis was reported, whether it was the most important or the least important of the diagnoses. In general, the importance of the diagnosis in a given illness was tabulated in accordance with the report of the family informant as to which diagnosis had the longest disabling duration or, in the absence of any difference between the durations, which diagnosis was the most important as a cause of this disabling illness. Each of the other two diagnoses was tabulated in the same way.

This method of counting diagnoses leads to some overlapping among the three diagnosis groups considered in the study. To avoid this situation, the total number of cases of cardiovascular-renal diseases was determined by eliminating those cases of each of the three diagnoses which were contributory to one or both of the other two diagnoses and totaling the cases with only one of the three diseases and those with what was considered the principal of two or all three of the diseases. This process leads to an unduplicated total of cardiovascular-renal cases.

Table 2 shows for each diagnosis the percentage of cases in which one or both of the other diagnoses were also present. Thus, among the heart cases with 7 or more consecutive days of disability, 17.5 percent reported hypertension as another diagnosis on the case, 2.4 percent reported both hypertension and nephritis, and 5.4 percent reported only nephritis. Among the nondisabling cases the percentages were not far different, 16.2, 0.9, and 2.2, respectively, each one lower than for the 7-day disabling cases. Similar data for hypertension and neph-

[6] In an intensive survey (*4*) with monthly visits to families in a section of Baltimore, comparable prevalence rates for all recorded cases of heart disease were 75 percent higher than found in the present study, 49 percent higher for hypertension, 107 percent higher for nephritis, and 55 percent higher for the unduplicated total of cardiovascular-renal diseases. Corresponding figures for cases with any disability during one year were 41 percent higher for heart, 45 percent higher for hypertension, 72 percent higher for nephritis and 28 percent higher for cardiovascular-renal diseases.

Table 2. *Percentage of cases* [1] *of each of the 3 diagnoses that were complicated by another disease of the cardiovascular-renal group—all types of survey cases of all ages in 83 cities and towns in 18 States, 1935–36*

Sex and type of case	Heart disease complicated by—			Hypertension complicated by—			Nephritis complicated by—		
	Hypertension only	Hypertension and nephritis	Nephritis only	Heart disease only	Heart disease and nephritis	Nephritis only	Heart disease only	Heart disease and hypertension	Hypertension only
Disabling for 7 consecutive days or longer:									
Both sexes	17.5	2.4	5.4	24.7	3.2	4.1	13.6	5.9	6.6
Male	16.4	2.4	5.7	26.9	3.8	4.7	15.3	6.6	7.2
Female	18.6	2.3	5.1	23.1	2.8	3.7	12.1	5.4	6.2
Nondisabling and intermittent disabilities of less than 7 consecutive days:									
Both sexes	16.2	.9	2.2	15.1	.9	2.4	8.3	3.3	9.4
Male	13.0	.7	2.1	14.9	.8	2.6	6.7	2.3	6.6
Female	18.0	1.0	2.2	15.2	.9	2.3	9.5	4.0	11.3

[1] Cases of each diagnosis include those classed as the sole, primary, or contributory cause of the illness.

ritis show larger differences between the 7-day disabling cases and the nondisabling cases.

Proportions of Cases and Deaths of Each Diagnosis in the Total Cardiovascular-renal Group

Considering the proportion of deaths from the three causes that make up the total cardiovascular-renal mortality, heart disease accounts for 64 percent, hypertension 23 percent, and nephritis 13 percent for all ages. Considering corresponding percentages for the unduplicated counts of cases that make up the total cardiovascular-renal case-load, heart disease accounts for 45 percent, hypertension 42 percent, and nephritis 13 percent. These percentages for all ages are the same whether or not congenital heart disease is included in the computation. The case data may be further subdivided: of the total cardiovascular-renal cases for all ages, 39.8 percent reported heart disease only, 7.9 percent heart with hypertension, 38.6 percent hypertension only, 1.6 percent hypertension and nephritis, and 12.1 percent nephritis only.

Figure 1 shows by 5-year age groups the proportions of the unduplicated count of cardiovascular-renal cases that were heart disease only, hypertension only, and nephritis only; it also shows the proportions of cases with diagnoses of both heart disease and hypertension, and of cases with both hypertension and nephritis, including in both groups a few cases with heart disease and nephritis separated according to which disease was the principal cause of the illness. More searching inquiry of the informant or more extensive verification by attending physicians probably would have revealed more of these

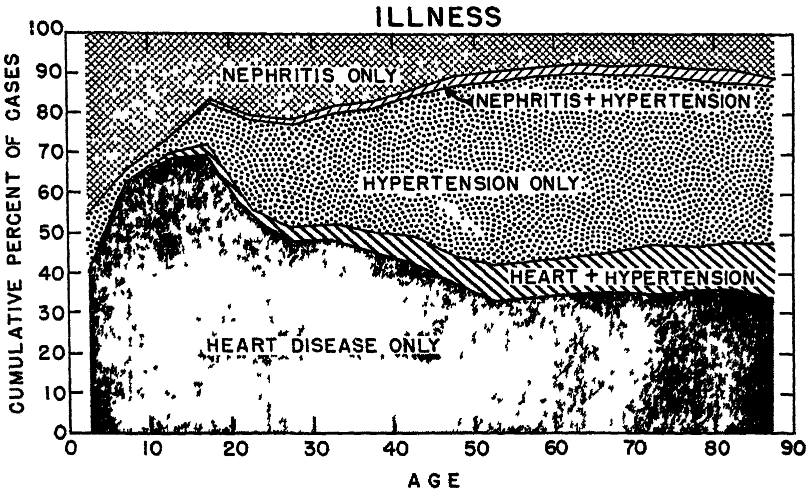

Figure 1. Proportion of all recorded cases of cardiovascular-renal diseases reported as due to each of the three diagnoses and to combinations of these diagnoses, by 5-year age groups—canvassed families in 83 cities and towns, 12 months, 1935–36 (congenital heart excluded).

cases with two or more cardiovascular-renal diseases, but the recorded proportions seem worth reporting.

Although in this study congenital heart disease is usually included with other heart diseases, for this particular chart and figure 2 it seemed better to eliminate congenital from consideration. Of the total cardiovascular-renal cases under 5 years of age, only 40 percent

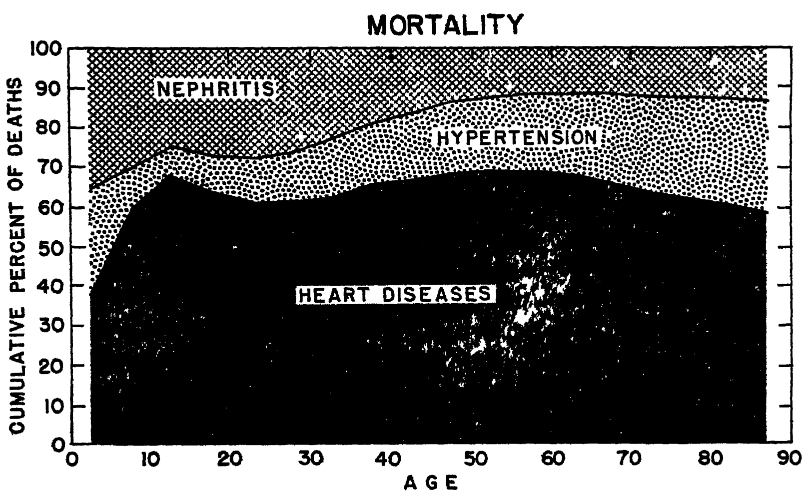

Figure 2. Proportion of deaths from cardiovascular-renal diseases classified as primarily due to each of the three diagnoses, by 5-year age groups—registered deaths in the total United States, 2 years, 1945 and 1946 (congenital heart excluded).

represented heart diseases without hypertension or nephritis (51 percent, if congenital is included). From the 40 percent starting point, the proportion of cases with heart disease alone increases rapidly to a maximum of 70 percent at 15–19 years of age when rheumatic heart disease is important. Above 20 years the proportion decreases moderately to a minimum of 33 percent at 50–54 with a slight rise to 36 percent at 80–84. The percentage of cardiovascular-renal cases reporting both heart disease and hypertension ranges from practically zero under 15 years to 13 percent at 85 years and over.

The decrease in the proportion of heart disease only in the adult ages is largely accounted for by an increase in hypertension only and in heart with hypertension also. These two groups amount to very little for the ages under 20, but after 50 years they account for more than half of all cardiovascular-renal cases. Nephritis, on the other hand, amounts to 45 percent at ages under 5 years (37 percent, if congenital heart is included), declining to 17 percent at 15–19 years, after which there is a small increase followed by a gradual decrease to 10 percent at 55–59 years with not much change thereafter. Nephritis with hypertension is almost negligible in these data, the maximum percentage at 80–84 years amounting to 2.6 percent of all cardiovascular-renal cases at that age.

Figure 2 is set up in a similar way but pertains to deaths in the United States for the 2 years, 1945 and 1946. Heart disease accounts for 38 percent of the cardiovascular-renal deaths under 5 years of age (91 percent, if congenital heart is included). From the low figure of 38 percent it rises to 67 percent at 10–14 years, after which it fluctuates between 61 and 69 percent, except at 85 years and over when it drops to 58 percent. For hypertension (including high blood pressure, intracranial vascular lesions, and arteriosclerosis), the deaths in this group are rather largely accounted for by intracranial vascular lesions, whereas the great majority of the cases of illness are hypertension of a less severe degree. For the ages under 5 years this hypertension group of deaths amounts to 26 percent of the total cardiovascular-renal deaths (4 percent if congenital heart is included); after 5 years it accounts for only about 10 percent up to 20 years of age, with a gradually increasing proportion up to 29 percent at 85 years and over. Nephritis deaths amount to 36 percent of the cardiovascular-renal deaths for the ages under 5 years (5 percent if congenital heart is included) with a general decline in the percentage to 11 at 60–64 years, after which there is a slight increase to 13 percent at 85 years and over. Thus in terms of deaths, heart disease is a considerably more important part of the total cardiovascular-renal group than in terms of prevalent cases.

Age Incidence and Prevalence [7] of Each Disease by Onset and Disability

The charts of age variation are presented on a semi-logarithmic grid. Moreover, each chart shows an excessive number of curves in the same field. This mode of presentation was selected to facilitate comparison of (*a*) the shape of the age curves for the different severity categories of the given diagnosis; (*b*) the relative differences at specific ages between rates for the various types; and (*c*) the relative increase with age in the rates for a given severity category in different periods of life. No other type of chart would make these comparisons as easy as the semi-logarithmic grid used for plotting age specific rates in this paper.

Age Variation in Prevalence Rates

Figure 3 shows for the three diseases and the total cardiovascular-renal group prevalence rates for all cases with any disability, including the relatively small group who suffered intermittent disabilities during the year but none with a duration of as much as 7 consecutive days (tables 3, 4, 5, 6). On the right half of the chart, incidence curves are shown for new cases—that is, cases disabling for 7 consecutive days or longer with onset of disability within the study year for patients who reported that they had never before suffered an attack of the disease.

For the disabling prevalent cases, hypertension shows the greatest variability with age, ranging from a low of 17 per 100,000 population at 5–9 years to a maximum of 9,625 for persons over 85 years of age. The hypertension rate for disabling cases does not reach the level of nephritis, the lowest of the other diseases, until nearly 40 years of age and the level of heart disease until about 75 years, but for the three age groups above 75 years the hypertension rate slightly exceeds the heart rate. Heart disease rates are higher at 10–14 years than in the next three age groups, reflecting the higher incidence of heart disease complicating or following rheumatic fever at these early ages. For new disabling cases with no history of previous attack, the general situation is the same, but the rate for hypertension is slightly but consistently greater than for heart disease in the six age groups above 60 years. Above 40 years nephritis has the lowest of the three rates, the maximum for new cases being 996 per 100,000 at ages 85 and over. For heart disease the rate of new cases at 5–9 years exceeds the five other age groups below 30 years.

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[7] The word prevalence is used in this study in the usual sense of the number of cases or the proportion of the population with a case on a given day. Since the diseases under consideration are all chronic, the concept is broadened to include all cases existing at any time during the study year as a better measure of the extent of illness from these causes. New cases, however, represent incidence of disabling cases but they are also included in the broader definition of prevalence

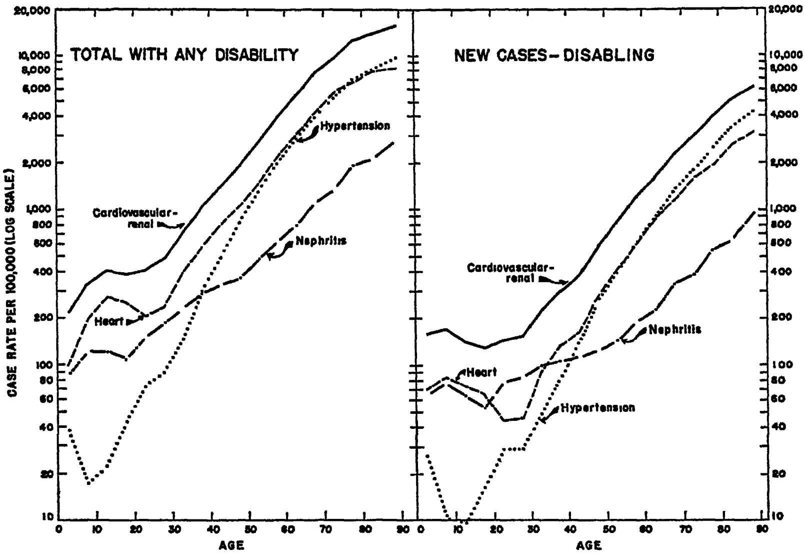

Figure 3. Age prevalence of all disabling cases and age incidence of new cases disabling for 7 consecutive days or longer for all cardiovascular-renal diseases and for each of the three diagnoses—canvassed families in 83 cities and towns, 12 months, 1935–36 (sole, primary, and contributory causes).

The following table gives in broad age-groups case rates per 100,000 population for new cases disabling for 7 consecutive days or longer (onset of disablity within study year and no previous attack), and for all new cases including those with and without disability (total duration of symptoms less than 12 months prior to day of visit). (See footnote 4 for numbers of nondisabling new cases.)

Type of case	All ages			Both sexes, by age				Number of cases, all ages
	Both sexes	Male	Female	Under 20	20–44	45-64	65 and over	
New cases per 100,000								
Heart disease:								
New 7-day disabling cases	251	263	240	73	94	488	1, 598	6, 237
All new cases including nondisabling	303	300	305	100	138	569	1, 752	7, 529
Hypertension:								
New 7-day disabling cases	237	209	262	15	65	481	1, 917	5, 886
All new cases including nondisabling	311	257	360	22	121	652	2, 168	7, 725
Nephritis:								
New 7-day disabling cases	118	112	125	65	96	163	435	2, 943
All new cases including nondisabling	136	128	143	75	113	186	475	3, 373
Cardiovascular-renal:								
New 7-day disabling cases	518	496	538	149	238	961	3, 148	12, 877
All new cases including nondisabling	643	587	695	192	344	1, 196	3, 513	15, 996

In each diagnosis the percentage that the nondisabling new cases added to the new 7-day disabling cases was definitely greater for persons under 45 years than for those above that age, with the minimum percentage additions in the ages over 65 years. With the exception of nephritis, the nondisabling new cases added larger percentages to the new 7-day or longer disabling cases for females than for males of each age group. Nephritis showed the lowest percentage additions, which were roughly the same for males and females of corresponding ages.

Table 3. *Age and sex incidence and prevalence* [1] *of heart disease cases* [3] *(all forms) per 100,000 among 2,500,000 persons in 83 cities and towns in 18 States, 1935–36*

Type of case and onset of disability [2]	All ages: Number cases	All ages: Rate	Under 5	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85 and over
Total with any disability during year:																				
Both sexes	22,699	913	100.5	199.8	271.3	252.0	206.7	235.7	391	583	808	1,075	1,493	2,227	3,054	4,289	5,680	6,687	7,730	8,219
Male	10,241	858	118.2	207.0	262.3	255.1	142.1	154.5	227	436	677	975	1,355	2,245	3,239	4,540	6,211	6,940	8,282	8,372
Female	12,458	964	82.2	192.4	280.2	249.2	260.0	303.8	537	717	935	1,174	1,631	2,210	2,889	4,074	5,253	6,485	7,347	8,128
Onset [2] within study year and disabled for 7 or more consecutive days:																				
Both sexes	12,607	507	81.5	124.3	135.0	126.5	95.4	118.5	202	292	401	580	849	1,221	1,756	2,393	3,234	3,958	4,920	5,759
Male	5,809	487	103.3	128.5	129.4	138.5	61.2	80.2	128	230	346	552	809	1,240	1,856	2,467	3,545	4,069	5,635	5,980
Female	6,798	526	59.1	120.0	140.6	115.6	123.5	150.7	268	348	454	609	889	1,203	1,668	2,330	2,983	3,869	4,424	5,627
No previous attack (new cases):																				
Both sexes	6,237	251	72.1	84.8	71.3	66.2	44.6	45.9	94	136	163	282	420	607	872	1,154	1,603	1,929	2,623	3,202
Male	3,141	263	89.6	87.3	72.3	77.8	33.6	37.1	71	114	150	316	456	664	1,007	1,297	1,797	2,155	3,103	3,640
Female	3,096	240	53.9	82.3	70.3	55.7	53.6	53.2	115	157	176	249	383	552	753	1,031	1,447	1,749	2,291	2,938
Onset [2] prior but disabled during year:																				
Disabled 7 or more consecutive days:																				
Both sexes	5,264	212	15.2	31.6	47.7	57.2	40.5	38.8	63	105	169	221	310	563	766	1,160	1,544	1,826	1,970	2,011
Male	3,007	252	12.4	36.3	48.2	56.9	44.4	37.1	51	103	185	269	363	755	1,025	1,581	2,061	2,295	2,076	1,872
Female	2,257	175	18.0	26.8	47.1	57.4	37.4	40.1	73	107	153	173	256	381	537	800	1,128	1,453	1,896	2,094
Intermittent disabilities of less than 7 consecutive days:																				
Both sexes	4,828	194	3.8	43.9	88.6	68.4	70.8	78.4	127	187	239	273	334	442	531	736	902	903	840	449
Male	1,425	119	2.5	42.2	84.8	59.8	36.5	37.1	49	104	146	154	183	250	358	492	605	576	570	520
Female	3,403	263	5.1	45.6	92.5	76.2	99.1	113.0	196	262	329	392	485	626	684	944	1,142	1,164	1,027	406
Nondisabling residuals of previous cases:																				
With restriction of activity during year:																				
Both sexes	6,160	248	11.4	45.4	89.1	115.2	81.1	114.5	151	215	277	314	385	568	731	1,010	1,226	1,480	1,288	722
Male	2,192	184	10.0	42.2	86.5	118.6	56.2	78.2	70	147	218	201	256	390	563	808	1,039	1,180	1,300	676
Female	3,974	307	12.8	48.6	91.6	112.2	101.5	144.9	223	277	335	426	514	738	880	1,182	1,376	1,720	1,280	750
Without restriction of activity during year:																				
Both sexes	18,625	749	56.3	200.8	271.3	355.1	369.8	425.5	546	690	850	960	1,138	1,581	2,037	2,706	3,143	3,690	3,370	2,850
Male	6,687	560	66.0	216.8	266.8	297.8	280.3	279.6	349	488	625	640	771	1,169	1,614	1,993	2,556	3,224	3,263	2,704
Female	11,938	924	46.2	184.5	275.8	406.8	443.6	547.8	721	874	1,067	1,279	1,507	1,972	2,412	3,317	3,615	4,062	3,444	2,938
Total recorded cases of any kind:																				
Both sexes	47,490	1,910	168.1	445.9	631.7	722.3	657.7	775.8	1,088	1,489	1,935	2,348	3,016	4,375	5,822	8,005	10,049	11,857	12,388	11,792
Male	19,120	1,601	194.1	466.0	615.7	671.5	478.6	512.2	645	1,071	1,520	1,817	2,382	3,804	5,417	7,341	9,806	11,343	12,845	11,752
Female	28,370	2,195	141.3	425.5	647.6	768.2	805.1	996.5	1,481	1,867	2,337	2,879	3,652	4,920	6,181	8,573	10,244	12,267	12,071	11,816
	Population [4] in hundreds																			
Both sexes	24,866	------	1,582	2,027	2,245	2,222	2,244	2,244	2,012	2,069	1,892	1,661	1,375	1,010	821	617	408	243	107	51
Male	11,940	------	804	1,019	1,121	1,054	1,013	1,023	947	984	931	830	688	493	385	285	182	108	44	19
Female	12,927	------	779	1,008	1,124	1,168	1,231	1,221	1,065	1,085	961	831	686	518	435	333	226	135	63	32

[1] [2] See footnotes 1 and 2 on table 1.
[3] Heart disease refers to all types, including congenital and chronic rheumatic but not rheumatic fever; and excluding syphilitic and thyrotoxic.
[4] Infants born during study year are counted as averaging 6 months of observation. For detailed populations above 5 years, see Pub. Health Rep. 58: 1590 (1943).

Table 4. *Age and sex incidence and prevalence* [1] *of hypertension cases per 100,000 among 2,500,000 persons in 83 cities and towns in 18 States, 1935–36*

Type of case and onset of disability [2]	All ages		Age																	
	Number cases	Rate	Under 5	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85 and over
Total with any disability during year:																				
Both sexes	17,957	722	37.3	17.3	22.7	41.9	73 5	89.1	146	300	496	831	1,336	2,034	2,896	4,208	5,330	6,963	8,094	9,625
Male	6,836	573	46.0	25.5	20 5	34.1	40.5	47.9	77	169	325	523	892	1,699	2,460	3,855	5,161	6,438	7,666	9,412
Female	11,121	860	28.3	8.9	24.9	48.8	100.7	123.6	207	418	662	1.138	1,781	2,353	3,282	4,510	5,465	7,382	8,390	9,753
Onset [2] within study year and disabled for 7 or more consecutive days:																				
Both sexes	10,428	419	31.6	14.8	17.8	29.7	45 4	52.6	83	151	251	467	735	1,128	1,639	2,413	3,214	4,255	5,564	6,794
Male	4,080	342	38.6	22.6	19.6	20.9	22.7	28.3	50	97	170	317	523	1,031	1,389	2,179	3,078	3,958	5,316	6,292
Female	6,348	491	24.4	6.9	16.0	37.7	64.2	72.9	113	200	330	616	949	1,221	1,860	2,613	3,323	4,492	5,736	7,096
No previous attack (new cases):																				
Both sexes	5,886	237	25.9	10.4	9.8	16.7	29.4	29.9	50	84	142	261	402	637	865	1,347	1,775	2,441	3,409	4,334
Male	2,494	209	31.1	15.7	8.0	13.3	13 8	21.5	36	68	114	196	330	633	789	1,325	1,775	2,434	3,331	3,692
Female	3,392	262	20.6	5.0	11.6	19.7	42.2	36 8	63	99	170	325	474	641	933	1,365	1,774	2,446	3,460	4,720
Onset [2] prior but disabled during year:																				
Disabled 7 or more consecutive days:																				
Both sexes	3,712	149	5.7	1.5	2.2	3 6	8.0	8.9	14	40	78	107	227	403	651	997	1,424	1,835	1,792	2,323
Male	1,910	160	7.5	2.9	------	5.7	11.8	7.8	13	37	80	104	222	447	755	1,216	1,698	1,997	1,848	2,704
Female	1,802	139	3.9	------	4.4	1.7	4.9	9.8	15	42	77	111	232	361	558	809	1,204	1,705	1,754	2,094
Intermittent disabilities of less than 7 consecutive days:																				
Both sexes	3,817	154	------	1.0	2.7	8.6	20.1	27.6	49	109	166	257	373	503	607	799	691	874	737	508
Male	846	71	------	------	.9	7.6	5.9	11.7	15	36	75	102	147	221	317	460	385	483	503	416
Female	2,971	230	------	2.0	4.4	9.4	31.7	40.9	79	176	255	411	600	771	864	1,088	938	1,186	901	563
Nondisabling residuals of previous cases:																				
With restriction of activity during year:																				
Both sexes	4,913	198	------	1.5	3.1	10 8	20.5	34.8	73	124	188	290	431	621	819	1,021	1,232	1,241	1,130	742
Male	1,382	116	------	2.9	2.7	7.6	14.8	20.5	42	57	113	153	208	329	519	703	885	873	730	572
Female	3,531	273	------	------	3.6	13.7	25.2	46.7	100	184	261	426	654	898	1,084	1,293	1,002	1,534	1,406	844
Without restriction of activity during year:																				
Both sexes	23,803	957	3.2	3 5	9.4	70 2	203.2	311.0	448	665	988	1,542	2,174	2,962	3,664	4,480	5,050	5,199	4,462	3,124
Male	6,909	579	3.7	1.0	7.1	49 3	153.9	220.9	317	436	573	852	1,140	1,705	2,263	2,783	3,281	3,790	3,285	2,548
Female	16,894	1,307	2.6	6.0	11.6	89.1	243.7	386.5	565	873	1,391	2,230	3,212	4,159	4,904	5,933	6,474	6,322	5,277	3,470
Total recorded cases of any kind:																				
Both sexes	46,673	1,877	40.5	22.2	35.2	122.9	297.2	434.9	667	1,089	1,672	2,662	3,941	5,617	7,379	9,709	11,662	13,403	13,686	13,491
Male	15,127	1,267	49.8	29.4	30.3	91.1	209.2	289.4	436	662	1,010	1,528	2,240	3,732	5,243	7,341	9,328	11,102	11,681	12,533
Female	31,546	2,440	30.8	14.9	40.0	151.6	369.6	556.8	872	1,476	2,313	3,794	5,647	7,410	9,270	11,736	13,541	15,239	15,073	14,067

[1] [2] See footnotes [1] and [2] on table 1. For population used see table 3.

Table 5. *Age and sex incidence and prevalence [1] of nephritis cases per 100,000 among 2,500,000 persons in 83 cities and towns in 18 States, 1935–36*

Type of case and onset of disability [2]	All ages		Age																	
	Number cases	Rate	Under 5	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85 and over
Total with any disability during year:																				
Both sexes	8,011	322	87.2	121.8	120.7	108.0	148.8	183.6	231	291	336	364	479	628	792	1,138	1,373	1,962	2,175	2,811
Male	3,525	295	69.7	97.1	121.3	90.1	102.6	117.3	171	253	263	321	446	621	789	1,205	1,671	2,304	2,555	3,536
Female	4,486	347	105.3	146.8	120.1	124.2	186.8	239.1	284	325	407	407	511	635	795	1,079	1,133	1,690	1,912	2,376
Onset [2] within study year and disabled for 7 or more consecutive days:																				
Both sexes	5,417	218	77.1	106.0	94.9	86.9	121.6	138.6	170	208	221	255	311	404	492	682	770	1,121	1,307	1,718
Male	2,335	196	62.2	81.4	101.7	71.1	78.9	91.9	127	189	172	228	301	384	493	675	874	1,282	1,574	2,028
Female	3,082	238	92.5	130.9	88.1	101.1	156.8	177.7	208	225	268	283	321	423	492	689	686	993	1,122	1,532
No previous attack (new cases):																				
Both sexes	2,943	118	66.4	77.4	64.6	53.6	79.3	83.8	99	107	115	126	146	191	230	339	387	548	644	966
Male	1,333	112	53.5	66.7	69.6	43.6	57.2	63.5	80	102	98	124	153	189	254	355	462	678	753	936
Female	1,610	125	79.6	88.3	59.6	62.5	97.5	100.7	115	112	131	129	140	193	209	325	327	445	569	1,032
Onset [2] prior but disabled during year:																				
Disabled 7 or more consecutive days:																				
Both sexes	1,487	60	5.1	9.4	10.7	10.8	12.9	16.0	21	31	51	46	87	141	175	319	468	627	663	957
Male	810	68	6.2	11.8	8.9	13.3	13.8	14.7	16	25	49	47	94	175	202	411	671	818	776	1,300
Female	677	52	9.0	6.9	12.5	8.6	12.2	17.2	26	36	53	45	79	108	152	241	305	474	585	750
Intermittent disabilities of less than 7 consecutive days:																				
Both sexes	1,107	45	5.1	6.4	15.1	10.4	14.3	29.0	40	52	64	63	81	84	124	136	135	214	205	137
Male	380	32	1.2	3.9	10.7	5.7	9.9	10.8	29	39	42	46	51	63	93	119	126	204	205	208
Female	727	56	3.9	8.9	19.6	14.6	17.9	44.2	50	65	85	79	112	104	152	150	142	222	205	94
Nondisabling residuals of previous cases:																				
With restriction of activity during year:																				
Both sexes	1,228	49	3.2	9.9	16.5	9.5	15.6	22.7	27	48	49	56	79	109	156	217	287	293	280	371
Male	512	43	2.5	9.8	18.7	10.4	19.7	18.6	23	29	35	48	57	85	135	228	253	307	388	572
Female	716	55	3.9	9.9	14.2	8.6	12.2	26.2	31	65	62	64	101	131	175	207	314	282	205	250
Without restriction of activity during year:																				
Both sexes	5,611	226	33.5	92.2	104.2	62.6	98.5	141.7	168	224	252	286	330	476	558	742	1,010	1,072	1,251	781
Male	2,449	205	27.4	83.4	106.2	61.7	74.0	110.5	123	190	215	254	295	426	529	756	1,171	1,143	1,506	988
Female	3,162	245	39.8	101.2	102.3	63.4	118.6	167.9	209	255	288	318	364	523	583	731	881	1,015	1,074	656
Total recorded cases of any kind:																				
Both sexes	14,850	597	123.9	223.9	241.4	180.0	262.9	348.0	427	564	637	706	887	1,213	1,506	2,097	2,670	3,327	3,706	3,963
Male	6,486	543	99.6	190.3	246.3	162.2	196.4	246.3	317	473	514	623	797	1,133	1,453	2,189	3,095	3,753	4,449	5,096
Female	8,364	647	149.0	257.9	236.6	196.1	317.6	433.2	525	646	757	788	976	1,290	1,553	2,018	2,328	2,987	3,192	3,282

[1] [2] See footnotes [1] and [2] on table 1. For population used see table 3.

Table 6. *Age and sex incidence and prevalence* [1] *of cardiovascular-renal cases per 100,000 among 2,500,000 persons in 83 cities and towns in 18 States, 1935–36*

Type of case and onset of disability [2]	All ages: Number cases	All ages: Rate	Age: Under 5	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85 and over
Total with any disability during year:																				
Both sexes	40,719	1,638	220.0	332.4	405.4	380.7	409.0	486.1	716	1,061	1,445	1,962	2,784	3,990	5,439	7,702	9,644	12,347	13,732	15,209
Male	17,157	1,437	225.3	321.8	392.6	351.9	264.5	299.1	441	786	1,115	1,577	2,282	3,753	5,253	7,686	10,081	12,356	13,940	16,069
Female	23,562	1,823	214.5	343.2	418.1	406.8	528.0	642.8	959	1,312	1,764	2,346	3,287	4,215	5,604	7,716	9,923	12,341	13,588	14,692
Onset [2] within study year and disabled for 7 or more consecutive days:																				
Both sexes	23,972	964	185.8	240.7	241.0	229.5	252.6	301.7	431	593	775	1,133	1,606	2,283	3,125	4,412	5,653	7,450	9,046	10,562
Male	10,233	857	195.4	226.6	241.8	214.4	153.0	190.6	287	468	605	956	1,389	2,231	2,992	4,287	5,782	7,432	9,400	10,972
Female	13,739	1,063	176.0	254.9	240.2	243.2	334.7	394.7	559	706	940	1,309	1,824	2,333	3,243	4,519	5,549	7,464	8,801	10,316
No previous attack (new cases):																				
Both sexes	12,877	518	160.5	170.7	140.8	130.1	147.0	155.5	230	303	380	590	838	1,216	1,606	2,290	3,033	3,962	5,172	6,326
Male	5,919	496	166.8	166.8	143.7	129.9	97.7	115.4	177	254	322	564	812	1,279	1,653	2,418	3,183	4,246	5,430	6,448
Female	6,558	538	154.1	174.6	137.9	130.2	187.7	189.2	276	347	436	616	864	1,157	1,564	2,180	2,912	3,736	4,993	6,252
Onset [2] prior but disabled during year: Disabled 7 or more consecutive days:																				
Both sexes	8,329	335	25.3	41.4	58.8	64.8	55.7	58.8	84	154	249	314	492	861	1,244	1,932	2,618	3,298	3,333	3,709
Male	4,562	382	26.1	49.1	54.4	66.4	60.2	52.8	67	147	270	347	551	1,072	1,591	2,506	3,336	3,902	3,559	4,108
Female	3,767	291	24.4	33.7	63.2	63.4	52.0	63.9	100	160	230	280	434	661	937	1,440	2,040	2,816	3,176	3,470
Intermittent disabilities of less than 7 consecutive days:																				
Both sexes	8,418	339	8.8	50.3	105.6	86.4	100.7	125.7	200	315	420	515	685	845	1,070	1,358	1,373	1,600	1,354	937
Male	2,362	198	3.7	46.1	96.4	71.1	51.3	55.7	88	171	241	274	343	451	670	893	962	1,022	981	988
Female	6,056	468	14.1	54.6	114.8	100.2	141.4	184.2	300	445	594	757	1,029	1,221	1,424	1,756	1,704	2,060	1,612	907
Nondisabling residuals of previous cases: With restriction of activity during year:																				
Both sexes	10,344	416	14.5	56.2	105.6	131.9	110.5	160.0	230	344	446	577	741	1,045	1,392	1,791	2,170	2,362	2,091	1,464
Male	3,499	293	12.4	54.0	104.4	131.8	86.8	108.5	124	205	320	347	442	662	1,033	1,451	1,709	1,877	2,031	1,560
Female	6,845	530	16.7	58.5	106.8	131.9	130.0	203.1	325	470	568	806	1,040	1,410	1,709	2,081	2,540	2,750	2,133	1,407
Without restriction of activity during year:																				
Both sexes	42,670	1,716	92.3	295.5	381.3	472.5	642.1	833.7	1,078	1,450	1,906	2,499	3,196	4,363	5,426	6,670	7,766	8,468	7,627	5,916
Male	14,454	1,211	95.8	300.2	377.4	391.7	492.4	591.4	730	1,026	1,298	1,585	1,993	2,915	3,852	4,702	6,030	7,088	6,822	5,616
Female	28,216	2,183	88.6	290.6	385.2	545.5	765.3	1,036.6	1,387	1,835	2,495	3,411	4,404	5,741	6,819	8,353	9,165	9,569	8,185	6,096
Total recorded cases of any kind:																				
Both sexes	93,733	3,769	326.8	684.1	892.3	985.1	1,161.6	1,479.8	2,024	2,856	3,797	5,038	6,721	9,397	12,257	16,162	19,580	23,178	23,450	22,589
Male	35,110	2,941	333.5	676.0	874.4	875.4	843.7	999.1	1,295	2,017	2,734	3,509	4,717	7,329	10,138	13,839	17,820	21,321	22,793	23,245
Female	58,623	4,535	319.8	692.4	910.0	1,084.2	1,423.3	1,882.5	2,671	3,617	4,827	6,563	8,732	11,366	14,132	18,150	20,997	24,659	23,906	22,194

[1] [2] See footnotes [1] and [2] on table 1. For population used see table 3.

Figure 4 shows a variety of rates for each of the four groups of diseases. Referring first to heart disease, the rate for the total recorded cases levels off above 75 years and the rate for nondisabling cases decreases after that age. This drop in nondisabling cases at the oldest ages is true for those with as well as without restriction of physical activity. The same drop is seen for cases with intermittent disabilities of less than 7 consecutive days. Presumably these decreases are a reflection of the gradual increase with age in the severity of the cases, the nondisabled becoming disabled as they reach these advanced ages. On the other hand, the total disabling cases and even the new disabling cases continue to rise to a maximum for persons over 85 years of age.

Hypertension rates show much the same tendencies as heart disease with respect to the advanced ages; the nondisabling with and without restriction of activity and the cases with intermittent disabilities of less than 7 days all decrease at about 75 years, but the disabling cases increase to a maximum at 85 years and over. As already noted, hypertension rates show the greatest variation with age; the types of rates that account for this large variability are mainly the nondisabling cases.

With respect to nephritis, there is less difference between the age variation of the different types of rates. For nearly all degrees of severity the relative age curves are about the same, plotting roughly as straight lines on the semi-logarithmic grid. However, there is some tendency for the milder cases to decrease in the ages above 80 years. In nephritis, intermittent disability and restricted activity without complete disability are relatively less frequent than in heart disease and hypertension.

The cardiovascular-renal diseases are a composite of the three diagnoses and show largely the same picture as heart disease with rates for the nondisabling, those with restricted activity only, and those with intermittent disability turning down definitely after 75 years, and with a slight decline in those ages in the total recorded cases. As in the case of both hypertension and heart disease the rates for cases with restricted activity and intermittent disability are quite low in the younger ages.

Figure 4 also shows death rates from each of the three diagnoses and for the group of cardiovascular-renal diseases. These rates are based on deaths occurring during this study year as recorded in the family survey. They include all deaths in which the given diagnosis was a factor in the case, whether or not it was the primary cause. However, in the cardiovascular-renal total, cases or deaths are counted only once, even though heart, hypertension, and nephritis were all involved in the case. The causes of death reported by the family were corrected from death certificates which were obtained from State agencies for the great majority of the deaths.

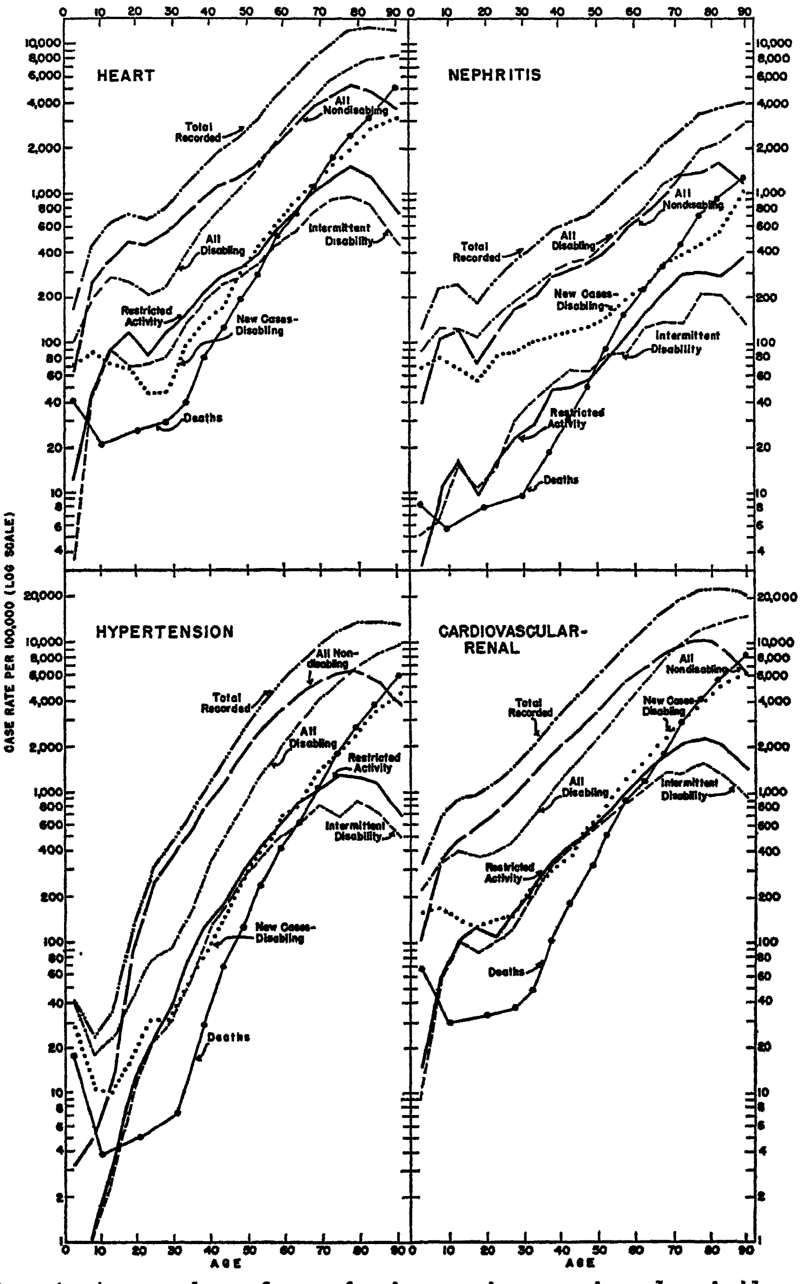

Figure 4. Age prevalence of cases of various severity categories and age incidence of new cases disabling for 7 consecutive days or longer for all cardiovascular-renal diseases and for each of the three diagnoses—canvassed families in 83 cities and towns, 12 months, 1935–36 (sole, primary, and contributory causes; for details about inclusions in each category, see footnotes to table 1).

In the ages above 70 years, the death rate from each of the three diseases exceeds the rate for new cases. In other words, deaths in these late ages are occurring faster than new cases are arising. For the unduplicated total represented by the cardiovascular-renal diseases, deaths exceed new cases only after 75 years of age.

Distribution of Cases of Each Diagnosis According to Onset and Disability

Figure 5 shows by age the relative composition of the heart disease case load in terms of cases with 7 or more consecutive days of disability (three groups at bottom of chart), with intermittent disabilities of less than 7 consecutive days, with restricted activity but without complete disability, and cases with no restriction or disability. Onset as used in this chart refers to the onset of disability and not to the original onset of signs and symptoms of the disease; hence nondisabling cases (with

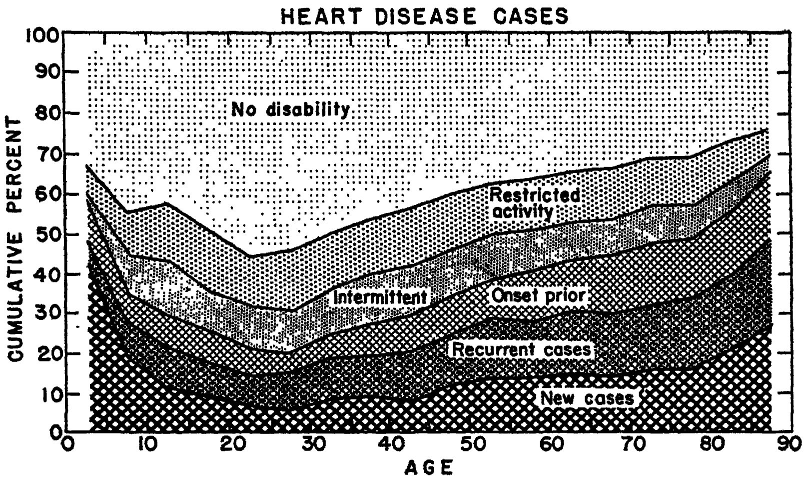

Figure 5. Proportion of all heart disease cases in each of six severity categories, by 5-year age groups—canvassed families in 83 cities and towns, 12 months, 1935–36, (sole, primary, and contributory causes; for further details, see footnotes to table 1).

or without restricted activity) and intermittent disabilities of less than 7 consecutive days are all excluded from the three categories with 7 or more consecutive days of disability during the year.

For all ages, 38 percent of the heart cases suffered 7 or more days of disability during the study year, or were hospitalized, or died before the 7th day of disability. Of this total of severe disabling cases during the year, 35 percent represented the first attack ever experienced, and 36 percent were patients who had suffered at least one attack previous to the study year. The remaining 29 percent

were disabled at the beginning of the year and remained so for 7 consecutive days or longer (average 295 days within the year per case).

In terms of proportions of cases, there is much variability with age in the heart disease case load (fig. 5). For the age group under 5 years, 58 percent of the cases were disabling for 7 consecutive days or longer including hospital cases and deaths (three bottom categories on chart). This high proportion is due in part to the inclusion of congenital heart cases which have a high fatality rate. From this peak of 58 percent, the 7-day disabling cases decreased to 20 percent at 25–29 years with a gradual increase thereafter to 66 percent at ages 85 years and over. Conversely, cases with no disability and no restriction, with restricted activity but no disability, and with only intermittent disabilities of less than 7 consecutive days, comprise 80 percent at 25–29 years. Patients with no disability and no restriction of activity comprise 55 percent of the cases at 25–29 years and 56 percent at 20–24 years.

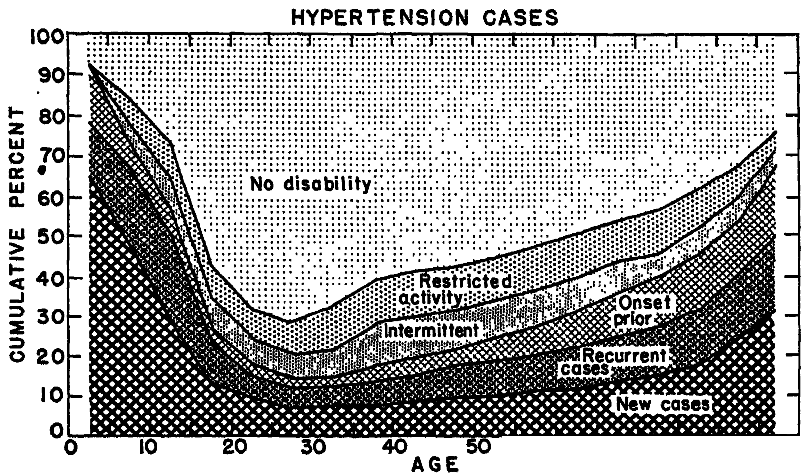

Figure 6. Proportion of all hypertension cases in each of six severity categories, by 5-year age groups—canvassed families in 83 cities and towns, 12 months, 1935–36 (sole, primary, and contributory causes; for further details, see footnotes to table 1).

Figures 6, 7, and 8 show similar data for hypertension, nephritis, and the total of cardiovascular-renal diseases. It may be noted that a very high proportion of the hypertension cases (fig. 6) have no disability, the largest percentage occurring at 25–29 years, with 72 percent having no disability and no restriction of activity, and 86 percent having either no disability, restriction of activity only, or intermittent disabilities of less than 7 consecutive days. From this low point of 14 percent for disabling hypertension cases of 7 consecutive days or longer, the disabling curves rise to high relative frequen-

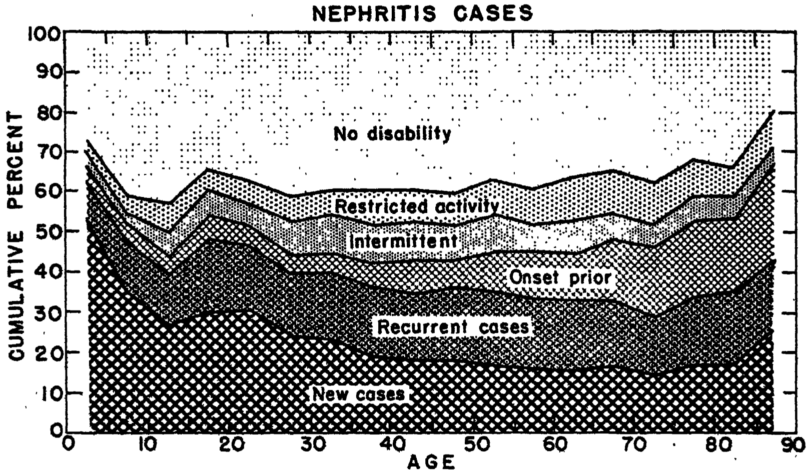

Figure 7. Proportion of all nephritis cases in each of six severity categories, by 5-year age groups—canvassed families in 83 cities and towns, 12 months, 1935–36 (sole, primary, and contributory causes; for further details, see footnotes to table 1).

cies of disability in the oldest and youngest ages. The proportions of cases of hypertension that disabled for 7 consecutive days or longer are much higher in the ages under 15 years than one would expect. However, it must be remembered that the total cases of hypertension and intracranial lesions are small in these ages so that a few cases may account for a considerable proportion of the total.

There is much less variation with age in the different types of cases

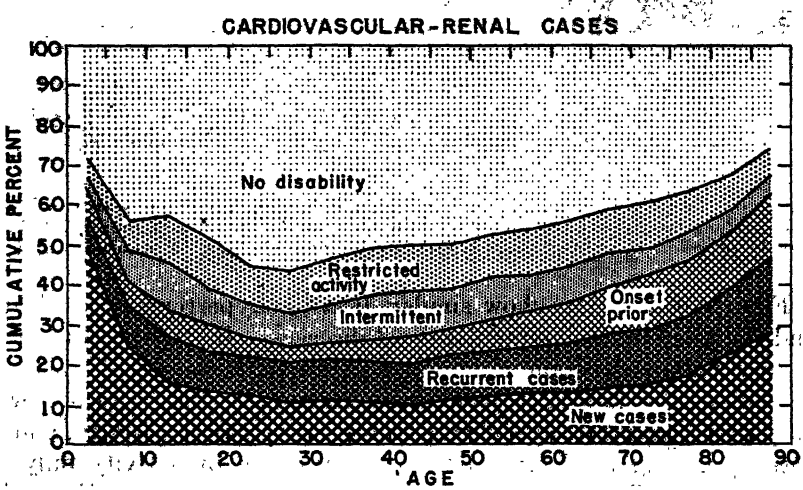

Figure 8. Proportion of all cardiovascular-renal diseases in each of six severity categories, by 5-year age groups—canvassed families in 83 cities and towns, 12 months, 1935–36 (unduplicated total of the three separate diagnoses; for further details, see footnotes to table 1).

of nephritis than in the other diseases. For example, the cases with no disability and no restriction of activity in the ages 5 to 85 vary only from 43 to 32 percent of the total nephritis cases (fig. 7). The age groups under 5, and 85 and over have slightly lower percentages of cases that are without disability. The largest variation with age occurs in the new cases with 7 or more consecutive days of disability.

Figure 8 shows a similar distribution for the combined cardiovascular-renal diseases, with duplicate cases eliminated. This chart depicts an average of the other three diseases. The general picture is more similar to heart disease than to hypertension or nephritis.

Sex Differences in Rates at Specific Ages

Data thus far presented have pertained entirely to both sexes combined. However, the trend of mortality from heart and related diseases has been considerably different for men and women and comparisons of morbidity rates for males and females are of interest. It may be recalled that heart disease mortality is consistently higher for men than women—a situation which is true of the great majority of the causes of death but not of the causes of illness.

Illness Rates Among Males and Females

Figure 9 shows illness rates for males and females of specific ages for three of the seven categories that were shown for both sexes in figure 4, namely, new cases disabling for 7 consecutive days or longer, all disabling cases, and the total recorded cases including nondisabling.

Referring first to heart disease, the total recorded cases are higher for females from 15 to 70 years of age; the relative difference decreases as age increases until above 70 years of age there is little or no difference. For all disabling cases, including those with intermittent disabilities of less than 7 consecutive days, the rate for females is higher from 20 to 55 years with slightly higher rates for males above 55 years. In the new cases with 7 or more consecutive days of disability, females are above males from 20 to 45 years, with higher rates for males above that age and with relative differences between the sexes increasing as age increases. In terms of fatal termination, these new 7-day disabling cases are the most severe (table 7). Thus as the severity of the case increases, the excess of the rates for males over females tends to be larger and to involve more of the adult age groups.

Hypertension rates are rather predominantly higher for women than men. Considering the total recorded cases and also all disabling cases, the rates for females are higher than those for males at all of the ages above 10 years. With respect to new cases disabling for 7 consecutive days or longer, the rates for females are higher than those for

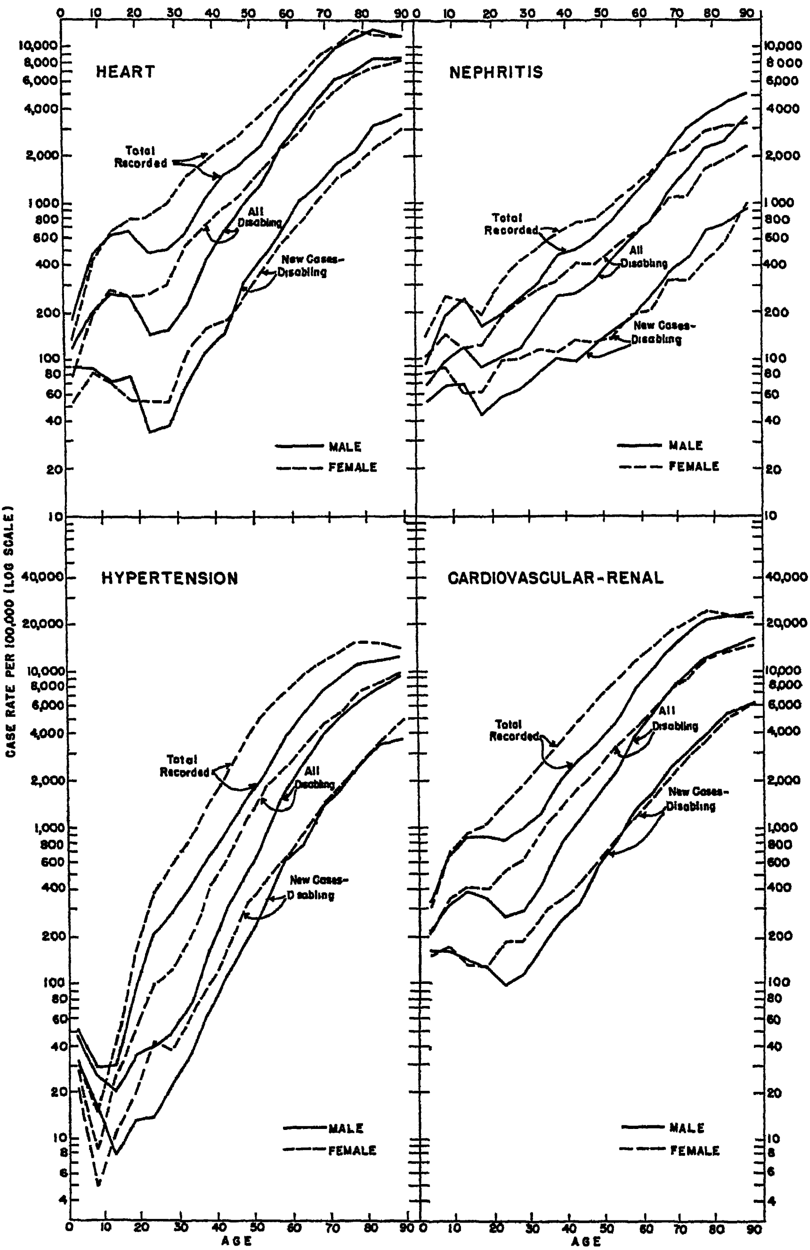

Figure 9. Age prevalence among males and females of all recorded cases and of all disabling cases, and age incidence of new cases disabling for 7 consecutive days or longer for cardiovascular-renal diseases and for each of the three diagnoses—canvassed families in 83 cities and towns, 12 months, 1935–36 (sole, primary, and contributory causes; for further details, see footnotes to table 1).

males from 10 to 55 years with negligible differences above that age.

The rates for nephritis for females are higher in the ages from 15 to 65 years for all recorded cases and for all disabling cases, and from 15 to 50 years for new cases disabling for 7 consecutive days or longer. Above those ages the rates for males are rather consistently higher than corresponding rates for females.

Death rates in the entire United States from these diseases, particularly from heart disease, are generally higher for males than females. In this survey the informants were usually women and they would be able to report more completely upon their own illnesses, particularly of the nondisabling type, and this type makes up a considerable part of the total recorded cases. As already noted, disabling illness from each of these cardiovascular-renal diseases usually involves a rather long duration of disability, and considerable time in bed. Therefore, for the cases disabling for 7 or more consecutive days, particularly those with onset of disability during the study year, the reporting error might be expected to be reasonably small. With respect to many other diseases, it has been noted that the incidence and prevalence of cases is generally higher for women than men, in spite of higher death rates for men (*6*). Thus, it cannot be assumed that the large sex differences in the rates are all due to incompleteness of reporting. Some of the difference may be accounted for by lack of knowledge of the informant as to the existence of the disease in the husband and other adults in the family. Moreover, women are generally in contact with physicians more than men, particularly during the childbearing ages, and it is possible that some of the excess in known cases, particularly of the minor type, is due to these more frequent visits to physicians which may lead to the discovery of more heart cases among women.

Death Rates Among Males and Females

Mortality recorded in the survey was much lower than registered in the United States—a difference which cannot be attributed to the absence of rural areas in the survey. In single-visit surveys of this type, deaths are always understated not so much because of forgetfulness as because death tends to break up families, leaving no residual of the family to report the death to the enumerator. Even if the widow is living with her father's family at the time of the survey, the death of her husband is missed because it did not occur in the family for which reports are being recorded (*12*).

Before considering sex differences, it may be well to consider the form of these mortality curves as plotted for 1945–46 on a semilogarithmic grid (fig. 10). From the ages of 30 to 80 years the mortality curves for females for nephritis, for heart disease, and for the cardio-

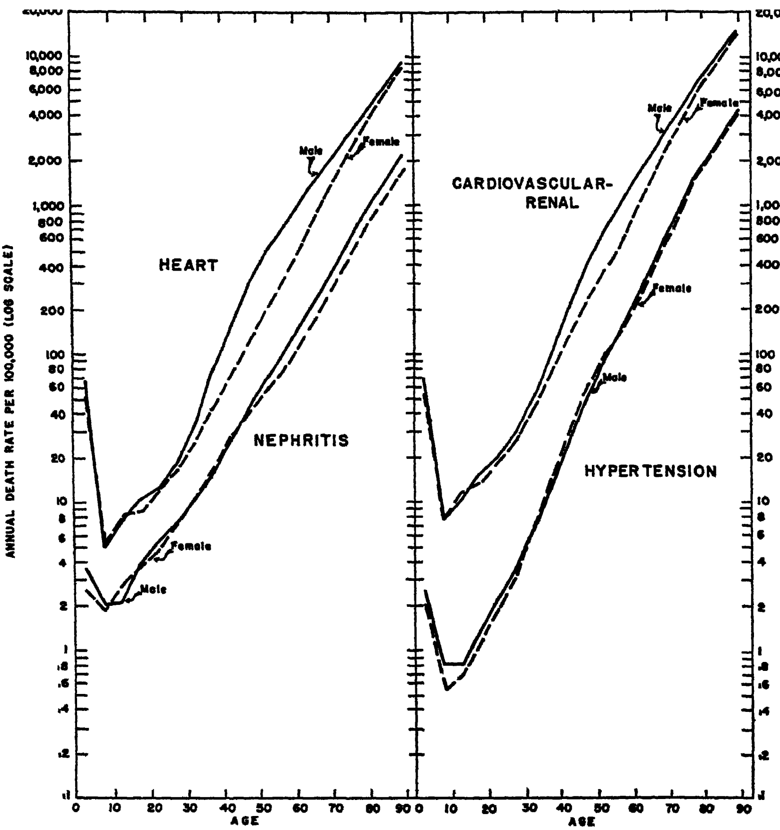

Figure 10. Annual age-specific mortality rates among males and females from all cardiovascular-renal diseases and from each of the three diagnoses—registered deaths in the continental United States, 2 years, 1945 and 1946 (sole or primary causes).

vascular-renal total tend to plot as a straight line. Such a straight line on a semi-logarithmic chart indicates that throughout this long age range the death rate increases at a constant percentage. For example, the percentage increase in the rate from 30 to 35 years is approximately the same as from 75 to 80 years. The curves for males for heart disease and for the total cardiovascular-renal group bow gradually upward in the middle ages. This means that the percentage increase with age in these death rates is somewhat higher in the younger than in the older ages of life. The mortality curves for hypertension are fairly straight but there is a slight upward bow in the middle ages for both males and females.

Death rates (sole and primary causes) from heart disease (including or excluding congenital) in the United States in 1936 showed no consistent sex differences in the ages under 30 years. After 30 years, the rates separate with those for males remaining consistently above

those for females to the end of the life span. By 1945–46 (fig. 10) the heart disease death rates were consistently higher for males of the several age groups above 15 years and the relative differences between the sexes were larger than at the time of this survey in 1935–36. The maximum relative differences between heart disease death rates for males and females occurred at 50–54 years with the 45–49 and 55–59 age groups close seconds. Above and below these ages the relative differences gradually decreased. Presumably industrial work is an important factor in these sex differences. It will be remembered that the more severe types of heart and other cardiovascular-renal diseases tended also to show higher rates for males in the older ages.[8]

Death rates from hypertension in 1945–46 were slightly but consistently higher for males under 30 years, very slightly lower for males from 30 to 55 years, and slightly higher for males over 55 years (fig. 10). Although the relative differences were consistent within the age periods mentioned they were so small as to be of little significance. The situation in the United States in 1936 was approximately the same.

Nephritis mortality among males and females under 45 years showed no consistent differences between the sexes. Above 45 years the mortality was higher for males, the relative differences being about the same throughout the remaining years of life (fig. 10).

Mortality rates, based on deaths recorded in the survey, show somewhat more consistent excesses for males than is true of rates based on registered deaths in the entire United States in either 1935–36 or 1945–46. As already noted, there are biases in mortality rates recorded in single-visit surveys due to the fact that sometimes there is no residual of the household to report the death (*12*). With respect to sex differences women live longer, on the average, than men and probably a higher percentage of widows than widowers maintain a home after the death of the spouse. Thus there is a greater probability of the house-to-house canvasser obtaining from the widow a record of the death of her husband than of obtaining from the widower a record of the death of his wife.

In view of the rather consistently higher survey case rates for the cardiovascular-renal diseases among females, with the reverse for death rates, some reports on medical examinations may be reviewed. In examinations of men and women by the Life Extension Institute (*1*), findings in terms of rates for organic heart diseases, enlarged heart, and functional murmurs and irregularities were all higher for females than males for ages 20–59, and also for each of the subgroups, 20–44

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[8] Populations used included persons overseas, in spite of the exclusions of deaths overseas. Records indicate that very few deaths from chronic diseases occurred among the military forces overseas because of the policy of transferring by airplane such cases to hospitals within the continental United States as soon as possible. Thus the great majority of the deaths from chronic diseases occurred in the United States even for cases which originated in the overseas population.

and 45–59. In terms of simple averages of rates in 5-year age groups for the ages 20–59 years, the rate for organic heart lesions was 2.9 percent for men and 5.3 for women; enlarged heart, 2.6 for men and 3.2 for women. Arterial thickening was the only cardiovascular-renal condition which did not show an excess in the rate for women over men, the rates being 13.8 for men and 12.4 for women. On the other hand, examinations in 1940 of farm families receiving loans from the Farm Security Administration showed higher heart disease rates for men than women but blood pressures of 150 or above, systolic, or 90 or above, diastolic, or both, showed higher rates for women of comparable ages, as follows: 15–44 years, men 5.9 percent, women 7.4; 45 and over, men 32.6, women 46.1 percent (*13*).

In the New York study of hospital discharges (*7*, *19*), rates for hospital cases of heart disease were approximately the same for males and females; hypertension rates were lower and nephritis rates higher for females than males. The diagnosis groups were roughly comparable with those used in the present study.

Case Fatality

Detailed data are not available for computing what might be termed correct case fatality rates. However, ratios of deaths recorded in the survey to prevalent recorded cases will give some indication of fatality.

Ratio of Deaths During Year to Prevalent Cases

Table 7 shows these ratios in terms of deaths from the given disease as a percentage of the total recorded cases. Of all recorded heart cases, 11 percent were fatal during the study year. The corresponding percentages by sex were 16 for males and 8 for females. The highest fatality ratios for heart disease occurred at 65 years and over—24 percent for males and 15 percent for females. For hypertension, the fatality percentages were also uniformly higher for males than females at each of the broad age groups. For all ages and for the ages 65 years and older, the fatality ratios were roughly the same as those for heart disease, but for the two age groups from 20 to 64 years, hypertension fatality was definitely less than for heart disease. For all ages combined, nephritis showed approximately the same fatality ratio as heart disease, but for age groups under 45 years the ratios were consistently less than those for heart disease.

Relating the deaths from each disease to all cases with disability of 7 consecutive days or longer (including hospital cases and deaths before the 7th day), 30 percent of such heart cases ended fatally within the study year, 32 percent of hypertension cases, and 21 percent of nephritis cases. The figures for males are rather uniformly higher than those for females, reaching, for heart disease, 42 percent in the

Table 7. *Case fatality—ratio of deaths during study year to various types of cases—canvassed families in 83 cities and towns in 18 States, 1935–36*

Diagnosis and sex	All ages	Age				All ages	Age			
		Under 20	20–44	45–64	65 and over		Under 20	20–44	45–64	65 and over
	Percent of cases disabling for 7 or more days [1] that were fatal					Percent of all cases that were fatal				
Heart disease:										
Both sexes	29.5	17.0	19.2	27.2	38.9	11.1	5.2	4.9	10.7	18.8
Male	34.8	19.2	28.3	33.3	41.9	16.0	6.3	8.4	16.8	23.8
Female	24.3	14.7	13.3	20.3	36.0	7.7	4.2	3.1	6.5	15.1
Hypertension:										
Both sexes	32.0	25.6	15.8	25.6	41.3	9.7	11.7	2.8	6.8	17.2
Male	38.3	27.4	24.1	33.5	45.1	15.2	15.5	4.7	12.1	23.3
Female	27.3	23.5	11.6	19.8	38.3	7.1	8.8	1.9	4.4	13.8
Nephritis:										
Both sexes	21.1	7.3	7.1	25.3	37.5	9.8	3.8	3.2	11.2	18.7
Male	25.5	9.9	10.1	29.2	39.1	12.3	5.0	4.5	14.0	20.4
Female	17.5	5.3	5.4	21.6	35.7	7.9	2.8	2.4	8.9	17.1
Cardiovascular-renal:[4]										
Both sexes	25.3	13.7	13.2	23.4	35.6	8.7	5.0	3.4	7.6	15.6
Male	30.6	16.6	20.1	29.5	38.4	12.9	6.3	5.9	12.5	20.0
Female	20.9	11.0	9.1	17.7	33.0	6.2	3.9	2.2	4.7	12.7
	Percent of new cases [2] that were fatal					Number of deaths among new cases [3]				
Heart disease:										
Both sexes	38.2	21.9	26.0	35.9	49.9	2,380	130	256	853	1,138
Male	45.4	22.2	42.2	43.8	54.9	1,426	72	165	566	623
Female	30.8	21.6	15.4	26.5	45.0	954	58	91	287	515
Hypertension:										
Both sexes	36.5	28.1	16.2	32.2	45.8	2,151	34	110	753	1,252
Male	42.9	31.3	25.9	39.6	50.0	1,070	20	63	398	589
Female	31.9	24.6	10.8	26.6	42.6	1,081	14	47	355	663
Nephritis:										
Both sexes	17.8	5.1	4.4	24.1	42.3	524	27	44	191	262
Male	21.9	7.7	7.2	27.8	43.7	292	18	28	111	135
Female	14.4	3.1	2.6	20.3	40.8	232	9	16	80	127
Cardiovascular-renal.[4]										
Both sexes	29.6	15.1	14.2	29.4	42.4	3,817	182	353	1,377	1,902
Male	36.3	17.8	23.1	36.8	47.0	2,148	107	216	845	980
Female	24.0	12.4	8.8	22.3	38.4	1,669	75	137	532	922

[1] Cases designated as disabling for 7 consecutive days or longer include those disabled on the day of the visit, deaths before the 7th day, and hospital cases disabled for less than 7 consecutive days.
[2] New cases include only those of the type described in note 1 which had their onset of disability within the study year and no history of previous attack.
[3] Table 8 shows total deaths from the given cause.
[4] It should be noted that cases and deaths for 2 or more of the 3 diagnoses are counted in each diagnosis category involved, but the cardiovascular-renal group represents an unduplicated total of sole or primary causes within this group. Thus the cardiovascular-renal fatality ratio may lie outside of the limits of ratios for the 3 separate diagnoses.

ages over 65 years as compared with 36 percent for females. The fatality ratios for the four diseases are of the same order of magnitude in the age group over 65 years.

Of the 6,237 new heart cases with disability of 7 consecutive days or longer for patients who never had a previous attack, 38 percent were fatal within the study year as compared with 37 percent for hypertension, 18 percent for nephritis, and 30 percent for all cardiovascular-renal cases. Of the new heart cases 65 years old and over, 50 percent were fatal within the year, with ratios of 46 and 42 percent for hypertension and nephritis, respectively. For all ages and for each of the

four broad age groups for each disease, these fatality ratios are uniformly higher for males than females (table 7).[9]

Higher fatality ratios for males may result from less complete reports of cases among men because women are usually the informants and know their own ailments best. However, this situation would affect mainly the minor nondisabling cases rather than those disabling for 7 consecutive days or longer. The deaths used in computing the fatality ratios given in table 7 and discussed above were those recorded in the survey. In these death data the bias is toward more complete records for men, for reasons discussed in a preceding paragraph. However, studies of absences from work on account of illness from all causes indicate that women suffer more frequent illness than men (*4, 8, 10, 11*) even though their death rates are lower (*6*). Sex differences in illness may be exaggerated in this study, but it is believed that there are real differences, with higher case rates for females.

Hospitalized illness rates for New York City, based on a study of discharges from hospitals (*7*) during 1933, were far above rates for hospitalized cases in this surveyed group which covered many smaller cities and towns. The New York hospital case rates for heart diseases, hypertension, and the whole cardiovascular-renal group were equal to approximately 90 percent of the survey rates for cases disabled for 7 consecutive days or longer and with onset of disability within the study year; the corresponding figure for nephritis was 75 percent. Since these hospital rates are large, case fatalities in the New York study are of interest. In that study 29 percent of the hospitalized cardiac cases were fatal as compared with 30 percent fatal for all survey cases disabling for 7 consecutive days or longer, 33 percent for all such cases with onset of disability within the study year, and 38 percent for such new disabling cases. Case fatalities for the other diagnoses were: hypertension, 30 percent for New York cases, 32 percent for all survey 7-day or longer disabling cases, 32 percent for all such cases with onset of disability within the year, and 37 percent for such new disabling cases; nephritis, 23 percent for New York cases, 21 percent for all survey 7-day or longer disabling cases, 19 percent for all such cases with onset of disability within the year, and 18 percent for such new disabling cases. Thus, hospital case rates in New York City were of the same order of magnitude as survey cases with onset of disability within the study year and with

[9] The exclusion of the nondisabling new cases (original onset of symptoms within the study year) from the count of new 7-day or longer disabling cases obviously increases the computed case fatality because all deaths before the 7th day were counted with the 7-day or longer disabling cases. Case fatalities for all new cases (including nondisabling new cases) for all ages and both sexes may be compared with those for new 7-day or longer disabling cases in table 7, as follows: heart disease, 32 percent died within the study year; hypertension, 28 percent; nephritis, 16 percent; and total cardiovascular-renal diseases, 24 percent. See footnote 4 and table on p. 1449 for other data relating to nondisabling new cases. While the fatalities for new cases computed in this way are considerably lower than those for new 7-day or longer disabling cases in table 7, they are still roughly comparable to those for hospital cases in New York City (*7*).

7 or more consecutive days of disability, and the cases experienced roughly the same fatality as in this study.

Proportion of Deaths Occurring Suddenly

Deaths in this survey were recorded as cases with fatal terminations. Therefore, data are available on each death as to the days of disability which preceded death. The records indicated that a high percentage of the heart deaths occurred immediately (without disability) or with only one day of disability. Presumably the count of these cases can be interpreted as the number that died from a heart attack either immediately or within approximately 24 hours. Table 8 shows in broad age groups what percent of the deaths were immediate (died without disability) and what percent died within approximately 24 hours, including those who died immediately. The upper half of the table shows these figures for new cases—that is, those with onset of disability within the study year and with no previous attack. In this group 17 percent of the heart deaths of all ages were immediate and 31 percent were immediate or within approximately 24 hours. At the peak age group, 45–64 years, the figures were 24 percent without disability and 39 percent died within 24 hours. A consistently higher percentage of the male than the female deaths occurred suddenly; for all ages, 22 percent of the deaths of males were without disability as compared with 11 percent for females. Corresponding proportions of deaths that occurred within 24 hours of the attack were 37 percent for males and 23 for females. In the age group 45–64, 28 percent of the deaths of males and 14 percent of those of females were immediate, and 44 percent of those of males and 30 percent of those of females were within 24 hours of the onset of the disabling heart attack.

Sudden deaths from hypertension were less frequent and were almost negligible for nephritis.

The lower half of table 8 shows similar percentages based on all deaths that occurred within the study year rather than deaths of new cases only. However, deaths with onset of the fatal disabling case prior to the study year are never counted as sudden deaths. As might be expected, sudden deaths constitute a smaller proportion of all deaths than they do of deaths from new cases.

Since the percentages of heart deaths that occurred suddenly varied so definitely with age, the figures were computed for more detailed age groups for heart disease and hypertension. Figure 11 shows these data graphically. It is seen that the percentages of all heart deaths that occurred suddenly are uniformly less for females than males. The peak for both of the sexes occurs at 45–54 years, with 33 percent of deaths of males within approximately 24 hours of the onset of the disabling attack as compared with 22 percent for females.

Table 8. *Percentage of deaths from the different diagnoses in the group of cardiovascular-renal diseases occurring suddenly or within 24 hours of onset of disability—canvassed families in 83 cities and towns in 18 States, 1935–36*

Age and sex	Percent of deaths occurring suddenly (no disability)				Percent of deaths within 24 hours [1] of onset of disability				Number of deaths during study year			
	Heart disease	Hypertension	Nephritis	Cardiovascular-renal	Heart disease	Hypertension	Nephritis	Cardiovascular-renal	Heart disease	Hypertension	Nephritis	Cardiovascular-renal
Deaths Among New Cases [2]												
All ages:												
Both sexes	17.4	9.5	2.5	14.1	31.3	23.2	8.2	28.3	2,380	2,151	524	3,817
Male	21.9	11.9	1.7	18.0	36.6	27.5	7.2	33.5	1,426	1,070	292	2,148
Female	10.7	7.2	3.4	9.0	23.3	19.0	9.5	21.6	954	1,081	232	1,669
Under 20 years												
Both sexes	3.1	2.9	------	2.7	16.2	32.4	------	17.6	130	34	27	182
Male	1.4	5.0	------	1.9	19.4	40.0	------	20.6	72	20	18	107
Female	5.2	------	------	4.0	12.1	21.4	------	13.3	58	14	9	75
20–44:												
Both sexes	20.7	16.4	4.5	18.1	34.8	25.5	4.5	30.6	256	110	44	353
Male	23.6	20.6	7.1	21.3	41.2	27.0	7.1	36.1	165	63	28	216
Female	15.4	10.6	------	13.1	23.1	23.4	------	21.9	91	47	16	137
45–64:												
Both sexes	23.6	11.3	2.6	18.6	39.5	32.1	11.5	37.3	853	753	191	1,377
Male	28.4	14.3	1.8	22.2	44.3	37.2	9.9	42.4	566	398	111	845
Female	13.9	7.9	3.8	11.3	30.0	26.5	13.8	29.1	287	355	80	532
65 and over:												
Both sexes	13.8	8.1	2.3	11.1	26.0	17.3	7.3	22.4	1,138	1,252	262	1,902
Male	18.0	9.5	.7	14.5	30.3	20.5	5.9	26.7	623	589	135	980
Female	8.7	6.8	3.9	7.6	20.8	14.5	8.7	17.8	515	663	127	922
All Deaths [3]												
All ages:												
Both sexes	11.6	6.4	2.0	9.4	21.4	15.8	5.9	19.2	5,265	4,523	1,459	8,183
Male	14.8	7.7	1.9	12.0	25.2	17.6	5.9	22.4	3,067	2,294	801	4,524
Female	7.1	5.1	2.1	6.2	16.2	14.0	5.9	15.3	2,198	2,229	658	3,659
Under 20 years:												
Both sexes	3.7	1.9	------	2.9	12.3	25.9	------	13.4	219	54	60	306
Male	3.9	3.2	------	3.3	15.6	32.3	------	16.7	128	31	36	180
Female	3.3	------	------	2.4	7.7	17.4	------	8.7	91	23	24	126
20–44:												
Both sexes	13.0	10.3	2.1	11.5	22.3	18.5	5.5	20.3	593	232	145	793
Male	15.1	11.8	2.6	13.2	27.0	18.5	5.3	23.7	344	119	76	447
Female	10.0	8.8	1.4	9.2	15.7	18.6	5.8	15.9	249	113	69	346
45–64:												
Both sexes	15.2	8.4	2.4	12.7	26.3	22.4	7.6	25.2	1,846	1,458	543	2,822
Male	18.8	9.5	2.3	15.7	30.1	24.1	7.9	28.6	1,192	809	305	1,716
Female	8.7	7.1	2.5	7.9	19.4	20.2	7.1	20.0	654	649	238	1,106
65 and over:												
Both sexes	9.4	5.2	1.8	7.3	18.6	11.9	5.2	15.4	2,600	2,776	710	4,253
Male	12.4	6.4	1.6	9.5	21.6	13.2	4.9	17.7	1,401	1,335	384	2,179
Female	5.9	4.0	2.1	5.0	15.1	10.8	5.5	13.1	1,199	1,441	326	2,074

[1] Within 24 hours includes sudden deaths (no disability) and deaths with only 1 day of disability.
[2] See footnote 2 on table 7.
[3] Based on all deaths that occurred within study year, counting as sudden or 1 day deaths only those with onset of disability within the year which had none or only 1 day of disability.

For children under 5 years the percentage is also high, presumably because of congenital malformations of the heart among the newborn.

Figure 11 shows these data for hypertension also. Hypertension, as will be recalled, includes in this study high blood pressure, arteriosclerosis, and intracranial lesions. The latter are included because they are usually accompanied by hypertension or arteriosclerosis or are an end result of these conditions. It is seen that the peak of sudden deaths occurs in the same age group as it does in heart disease, 45–54 years, but that the peak for under 5 years is even higher than for this middle-aged group.

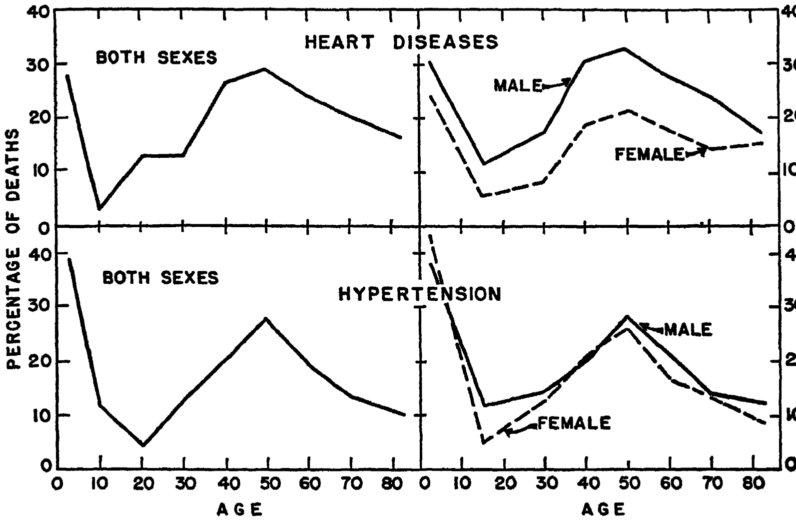

Figure 11. Proportion of heart disease and hypertension deaths from new cases among males and females of specific ages that occurred within approximately 24 hours of the onset of disability—canvassed families in 83 cities and towns, 12 months, 1935–36 (for definition of new cases, see footnotes to table 1).

Death Rates of Heart Patients as Compared With the General Population

In spite of deficiencies in the survey count of deaths, it is of interest to compare death rates of heart patients of various ages with death rates in the general population. Although the survey would probably miss heart diagnoses for patients who were killed in automobile accidents or who died from acute diseases unrelated to heart disease, the fact that the heart group includes all patients with a heart diagnosis as a sole, primary, or contributory cause of illness or death tends to include in the record more deaths among heart patients from acute and unrelated causes than would otherwise be picked up.

Figure 12 shows by age and sex the ratio of the death rate (all causes so far as obtained) among heart patients to the death rate (all causes) in the general population as represented by the annual death rate for the United States for the years of the survey, 1935–36. From a peak ratio at 5–14 years of age indicating that the annual death rate among heart patients of that age group was 26 times that for persons of the same ages in the general population, there is a steady decline until at 75 years and over this ratio is slightly less than 2. Presumably this curve indicates that children of 5–14 years of age with heart disease are a very unrepresentative sample of the population of those ages, with a relatively high risk of mortality. By the age of 75 years there is so much chronic disease and senile weakness in the general population that heart patients are not greatly different from the general run of individuals with respect to the risk of dying.

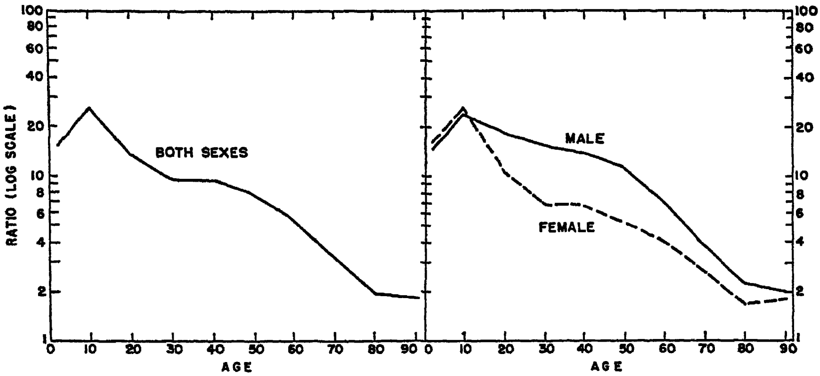

Figure 12. Ratio of the mortality from approximately all causes among heart patients to the mortality from all causes in the general population—age-specific death rates among heart patients in the canvassed families, 12 months, 1935–36, and annual age-specific death rates in the general population as registered in the continental United States, 2 years, 1935 and 1936.

Durations of Cases

The survey recorded durations of various kinds for cases of the different categories. Although the durations (except total duration of the disease) represent time within the study year only, an examination of the means and distributions will be of interest.

Mean Days Disabled per Case

Mean durations shown in table 9 refer to days within the study year only, and are incomplete for cases that existed prior to that year and also for those that were still disabled on the day of the visit. For those with their onset within the study year, the average disability would refer to the days within an average period of approximately 6 months, since these cases would have an average date of onset of roughly the middle of the study year. Considering all cases with disability of 7 days or longer for both sexes of all ages, the mean days of disability for heart disease was 136, with a mean for cases with onset of disability within the year of 70 days, and of 295 days for cases with onset of disability prior to the year. The corresponding means for hypertension were roughly the same as for heart disease, 130 for all cases, 75 for onset of disability within the year, and 283 for onset of disability prior to the year. For nephritis, however, the mean days of disability was somewhat less, and the figures for the total cardiovascular-renal diseases tend to approximate those for heart disease since that diagnosis had the largest number of cases.

With the exception of heart disease with onset within the year, the mean days of disability for cases of all ages was greater for males than females for the various diagnoses and for the different types of cases.

Table 9. *Mean days during the study year per case of the specified diagnosis and type—canvassed families in 83 cities and towns in 18 States, 1935–36*

[Cases disabled for 7 consecutive days or longer[1] during study year]

Type of duration and sex and age of patient	Total cases of given type				Cases with onset within study year				Cases with onset prior to study year				Total cases with 7 or more days of disability[1]			
	Heart disease	Hypertension	Nephritis	Cardiovascular-renal	Heart disease	Hypertension	Nephritis	Cardiovascular-renal	Heart disease	Hypertension	Nephritis	Cardiovascular-renal	Heart disease	Hypertension	Nephritis	Cardiovascular-renal
													Number of cases[2]			
Cases disabling for 7 or more days:[1]																
All ages:																
Both sexes	135.7	129.5	101.7	125.7	69.7	75.1	56.7	68.7	295.4	282.7	266.7	291.0	17,782	14,137	6,904	32,209
Male	147.1	145.2	114.8	140.0	68.7	79.0	60.4	70.5	299.5	287.2	271.8	296.8	8,770	5,990	3,145	14,748
Female	124.6	117.8	90.6	113.5	70.6	72.6	53.9	67.3	289.8	278.0	260.6	283.8	9,012	8,147	3,759	17,461
Both sexes:																
Under 20	117.9	85.0	58.2	92.9	70.6	61.5	46.9	60.2	267.9	258.6	172.9	252.1	1,215	210	817	2,160
20–44	128.9	109.4	76.0	104.9	67.2	67.3	49.3	59.9	296.9	278.7	257.3	285.4	3,076	1,468	2,044	6,010
45–64	140.2	131.2	106.1	130.3	72.3	77.3	60.7	71.8	305.5	292.8	262.7	300.6	6,792	5,700	2,144	12,045
65 and over	137.5	133.7	142.9	137.2	68.2	75.6	67.9	72.1	289.1	276.3	283.7	288.6	6,681	6,730	1,895	11,951
													Percent in bed			
Cases in bed for 1 or more days:																
All ages:																
Both sexes	51.7	53.3	44.0	49.4	33.7	35.9	29.0	33.0	107.7	114.3	108.8	110.0	84.3	85.9	88.5	85.3
Male	50.4	55.2	47.5	50.1	32.1	35.4	31.1	32.7	99.7	112.2	105.0	103.9	80.0	82.6	85.6	81.4
Female	52.8	51.9	41.3	48.8	35.0	36.3	27.5	33.2	116.4	116.2	113.0	116.0	88.4	88.3	91.0	88.6
Both sexes:																
Under 20	56.5	42.4	32.1	45.4	40.4	31.8	27.4	34.1	122.3	140.2	79.4	113.5	85.8	83.3	91.7	87.6
20–44	48.6	42.8	32.1	40.4	31.6	30.6	24.2	28.0	107.6	103.5	94.8	103.3	86.0	85.8	90.5	87.2
45–64	51.4	50.5	45.8	48.9	34.6	35.1	30.9	33.6	104.3	109.9	105.8	106.6	83.8	84.7	88.7	84.6
65 and over	52.6	58.1	61.0	55.2	32.4	38.0	34.5	35.1	108.9	118.5	120.1	114.5	83.7	86.9	84.9	84.7
													Percent in hospital			
Cases in hospital for 1 or more days:																
All ages:																
Both sexes	33.4	33.6	29.6	32.6	26.0	25.0	23.6	25.3	55.4	64.4	54.6	59.2	20.4	20.5	25.9	20.9
Male	36.9	37.6	33.9	36.6	27.6	25.9	26.4	27.6	60.5	73.4	61.1	64.2	23.3	25.8	28.9	24.3
Female	28.9	29.0	25.1	28.2	24.1	24.1	20.8	22.8	46.6	50.9	45.9	51.7	17.5	16.7	23.3	17.9
Both sexes:																
Under 20	52.9	28.5	33.9	42.2	37.2	24.4	29.6	32.3	103.2	95.8	63.4	92.0	30.0	50.5	30.7	31.9
20–44	31.9	27.4	26.5	28.9	24.1	22.2	20.6	22.2	54.3	50.7	57.5	55.8	27.0	31.1	30.7	28.4
45–64	33.5	33.9	28.5	33.0	27.0	25.3	23.1	25.7	52.1	65.9	50.0	59.1	21.7	22.3	26.0	21.5
65 and over	27.1	36.3	33.0	31.9	21.6	26.0	25.4	24.8	44.1	66.2	51.8	52.7	14.2	15.9	18.4	14.4

[1] Includes cases disabled on the day of the visit, deaths before the 7th day, and hospital cases disabled for less than 7 consecutive days during year.
[2] Includes some cases with unknown duration of disability if it was indicated that they caused loss of at least 7 days; excludes all other cases with unknown number of days of disability. Both these types of cases amounted to less than 1 percent of the 7 plus-day disabling cases for each diagnosis. All means and distributions are based on cases with known days of disability.

With respect to age, the cases under 20 years tend to show the lowest average days of disability; however, the increase in the means with age is less marked for heart disease than for hypertension and nephritis.

Mean Bed Days per Case

Although disability was recorded in detail only for cases with 7 consecutive days or longer, days in bed during the study year for those disabled cases were recorded for one day or longer. As might be expected, the mean days in bed are generally much less than the mean days of disability. The differences between the mean bed days for males and females are small and neither mean is consistently above the other. With respect to age, there is no regular trend in the means; heart disease cases under 20 years of age generally show higher mean days in bed than any other age group, no doubt because the young cases are rheumatic and bed rest is important. In hypertension and nephritis there is generally a fairly definite tendency toward an increase with age in mean days in bed.

Mean Hospital Days per Case

Of the total cases with 7 or more days of disability, 84 to 88 percent in the three disgnoses were in bed for one or more days during the study year (table 9). However, only 20 to 26 percent of the cases with 7 or more days of disability were in a hospital for one or more days during the year. For all hospital cases the average stay was 30 to 34 days in the three diagnosis groups, but in cases with onset of disability prior to the study year the mean days in the hospital per hospital case amounted to 55 to 64 days within the study year. Again in hospital cases of heart disease, the average stay was definitely greater for the ages under 20 years in total, onset within, and onset prior cases. For the other diagnosis groups the variation with age is irregular but there is some tendency toward as high or higher average days per case for patients under 20 years as in older age groups.

Distribution of Cases According to Days Disabled, in Bed, and in Hospital

As already noted, the days of disability recorded in this study pertain only to those within the study year. Therefore, the maximum disability for a given case was 12 months which would pertain to cases that had their onset of disability at the very beginning or at some time prior to the study year and were unable to work or pursue other usual activities at any time during the year.

Table 10 shows in actual numbers the distribution of cases with 7 or more days of disability according to days disabled, days in bed, and days in the hospital during the study year. At the bottom of the table is shown the percentage of the disabled cases that were disabled for 4 months or longer, 6 months or longer, and 12 months

or longer. For heart disease 42 percent of the cases were disabled for 4 months or longer, 34 percent for 6 months or longer, and 22 percent were disabled throughout the study year. For hypertension the figures were roughly the same except there were only 18 percent who were disabled throughout the study year. For nephritis there were fewer cases with long disability, 30 percent with 4 months or longer, 22 percent with 6 months or longer, and 13 percent disabled throughout the year.

Table 10. *Distribution of cases of the specified diagnosis according to the days of disability, in bed, and in a hospital during the study year—canvassed families in 83 cities and towns in 18 States, 1935–36*

[All cases disabled for seven consecutive days or longer [1] during year]

Duration in days (or months)	Days of disability				Days in bed				Days in hospital			
	Heart disease	Hypertension	Nephritis	Cardiovascular-renal	Heart disease	Hypertension	Nephritis	Cardiovascular-renal	Heart disease	Hypertension	Nephritis	Cardiovascular-renal
Number of cases												
Total [2]	17,726	14,007	6,880	32,033	17,774	14,126	6,901	32,192	17,777	14,136	6,903	32,201
None	------	------	------	------	2,796	1,997	793	4,726	14,163	11,235	5,121	25,493
Under 7 days	2,054	1,565	367	3,214	2,829	2,151	881	4,855	871	742	404	1,621
7–11	1,335	1,019	765	2,629	2,108	1,814	1,179	4,317	588	501	334	1,140
12–17	1,186	990	716	2,481	1,744	1,553	950	3,657	527	427	256	981
18–24	1,093	875	662	2,290	1,246	969	599	2,372	325	271	201	661
25–44	2,055	1,708	1,150	4,167	2,433	1,900	957	4,340	590	414	285	1,043
45–74	1,640	1,323	721	3,054	1,522	1,211	576	2,667	315	249	146	575
75–99	998	817	448	1,884	922	699	310	1,576	143	99	63	244
4 months	896	742	345	1,641	541	396	159	889	85	52	39	146
5 months	522	457	164	943	304	297	103	545	46	29	14	77
6 months	485	431	174	852	479	367	127	750	37	28	10	57
7–9 months	954	964	291	1,759	394	343	112	680	50	36	16	78
10–11 months	624	618	157	1,110	146	146	45	266	12	20	6	30
12 months	3,884	2,498	920	6,009	310	283	110	552	25	33	8	55
Percent of cases												
4 months or longer	41.5	40.8	29.8	38.4	14.5	15.1	10.7	13.4	7.1	6.8	5.2	6.6
6 months or longer	33.5	32.2	22.4	30.4	8.9	9.4	6.5	8.2	3.4	4.0	2.2	3.3
12 months	21.9	17.8	13.4	18.8	2.1	2.3	1.8	2.0	.7	1.1	.4	.8

[1] Includes cases disabled on the day of the visit, deaths before the 7th day, and hospital cases disabled less than 7 consecutive days.
[2] See footnote [2] to table 9.

The percentage of bed cases for longer periods was much less than those for disability. For heart cases that were in bed for one or more days, 2 percent were in bed throughout the year, as compared to 22 percent who were disabled throughout the year. Comparing cases in bed for 4 months or longer with cases disabled for 4 months or longer, heart disease shows 15 percent for bed cases and 42 percent for disabled; hypertension, 15 and 41 percent, and nephritis, 11 and 30 percent, respectively.

Mean Total Duration in Years.

Table 11 shows the mean total duration of cases since first diagnosed or since the time first definite symptoms were noted. The data are

shown by sex and age at the time of the survey and separately for cases that caused disability of 7 consecutive days or longer during the yeaı and for nondisabling cases including those with intermittent disabilities of less than 7 consecutive days.

The most interesting item about the table is the difference between the mean total duration of the severe 7-day cases and those that had little or no disability during the study year. Considering heart disease, the mean total duration for all cases was 7.4 years, but the corresponding mean total durations for cases with 7 or more disabling days and for nondisabling cases were 4.9 and 9.0 years, respectively, a ratio of nondisabling to disabling of 1.8. The other two diagnoses and the cardiovascular-renal total show similarly large excesses in

Table 11. *Mean duration in years since disease was first diagnosed or since symptoms were first noted—canvassed families in 83 cities and towns in 18 States, 1935–36*

Sex and age of patient at time of survey	All recorded cases [1]				Cases disabling for 7 consecutive days or longer during year [1]				Cases with no disability or with intermittent disabilities of less than 7 consecutive days [1]			
	Heart disease	Hypertension	Nephritis	Cardiovascular-renal	Heart disease	Hypertension	Nephritis	Cardiovascular-renal	Heart disease	Hypertension	Nephritis	Cardiovascular-renal
All ages:												
Both sexes	7.4	5.5	6.4	6.6	4.9	3.8	4.1	4.3	9.0	6.4	8.5	7.8
Male	6.9	5.3	6.4	6.3	4.7	3.8	4.1	4.2	8.8	6.3	8.5	7.9
Female	7.8	5.7	6.5	6.7	5.1	3.8	4.1	4.4	9.1	6.4	8.4	7.7
Both sexes:												
Under 20	4.8	2.9	3.7	4.4	3.1	2.2	1.6	2.5	5.5	3.4	5.8	5.5
20–44	8.3	4.9	5.5	6.7	5.5	3.1	3.3	4.3	9.3	5.3	7.3	7.6
45–64	7.5	5.5	7.2	6.6	4.8	3.7	4.6	4.3	9.3	6.2	9.3	7.7
65 and over	7.3	6.1	7.6	6.9	5.1	4.0	5.4	4.6	9.5	7.5	9.8	8.6

[1] Excludes cases of unknown duration; all means based on cases of known duration.

mean total durations of the nondisabling cases; nondisabling hypertension cases had a total duration 1.7 times that of the disabling cases, nephritis, 2.1, and the cardiovascular-renal group as a whole, 1.8. These data suggest that the survivors of former attacks of heart disease have been able to get along for many years, whereas the cases with much disability during the study year are of shorter total durations including a considerable number of new cases with a high fatality.

The longer average total duration of the nondisabling cases holds true for males and females of all ages and for persons in each of the four broad age groups shown in the table. The mean total durations of hypertension and nephritis increase regularly with age; there is a definite tendency for such an increase in heart and the total cardiovascular-renal diseases, but with less consistency and regularity.

Mean total durations of all recorded cases are generally longer for females than males.

Distribution of Cases According to Total Duration

Table 12 shows the distribution of cases according to time (months and years) since the condition was first noticed. Considering all cases combined (disabling and nondisabling), roughly one-sixth of the heart disease and hypertension cases had arisen within a year, but one-fourth of the nephritis cases had their onset within that time. Considering longer durations, the proportion of cases arising within 5 years was 52 percent for heart, 62 percent for hypertension, and 59 percent for nephritis. On the other hand, 27 percent of the heart cases had lasted 10 years or longer, 17 percent of hypertension, and 23 percent of nephritis.

Table 12. *Distribution of cases according to duration in years since disease was first diagnosed or since symptoms were first noted—canvassed families in 83 cities and towns in 18 States, 1935–36*

Diagnosis	Total cases with known duration		Percent of cases of each duration:									
			Completed months			Years						
	Number	Percent	Under 3	3–5	6–11	1	2	3–4	5–9	10–14	15–19	20 and over
All cases:												
Heart disease	46,953	100	4.9	4.3	7.2	9.6	11.5	14.9	20.2	11.1	7.3	9.0
Hypertension	46,479	100	4.8	4.6	7.9	11.5	14.5	18.5	21.5	10.0	3.7	2.9
Nephritis	14,824	100	8.6	6.3	9.2	9.9	10.9	14.1	18.2	10.0	5.4	7.4
Cardiovascular-renal	93,031	100	5.4	4.7	7.7	10.3	12.7	16.3	20.5	10.5	5.6	6.4
7 day disabling cases:												
Heart disease	17,732	100	11.3	9.2	15.7	11.6	9.4	11.2	15.8	6.8	4.5	4.4
Hypertension	14,107	100	12.5	11.4	20.0	11.1	8.9	11.4	14.1	6.0	2.4	2.1
Nephritis	6,881	100	16.8	11.6	17.1	11.1	7.9	9.7	13.3	5.9	3.0	3.6
Cardiovascular-renal	32,132	100	13.3	10.7	17.8	11.1	8.8	10.8	14.3	6.3	3.5	3.4
Nondisabling cases [1]:												
Heart disease	29,221	100	1.1	1.3	2.1	8.3	12.7	17.2	22.9	13.6	9.0	11.8
Hypertension	32,372	100	1.5	1.6	2.6	11.7	17.0	21.6	24.8	11.7	4.3	3.3
Nephritis	7,943	100	1.4	1.7	2.3	8.9	13.5	17.9	22.5	13.6	7.6	10.6
Cardiovascular-renal	60,899	100	1.3	1.5	2.3	9.8	14.7	19.2	23.7	12.7	6.8	8.0

[1] Including intermittent disabilities under 7 days.

Table 12 shows also distributions according to the total durations of disabling and nondisabling cases separately. The contrast is striking; of the severe heart cases with 7 or more days of disability during the study year, 16 percent had a total duration of symptoms of 10 years or longer, as compared with 34 percent for nondisabling cases. Similarly large differences appear for the other diagnoses with respect to long cases. The percentages of cases lasting 10 years or longer are: hypertension, 10 and 19 percent for disabling and nondisabling, respectively; nephritis, 12 and 32 percent; and cardiovascular-renal, 13 and 27 percent. Relative differences are also large for cases lasting 20 years or longer: 4.4 percent of disabling heart cases had a duration of 20 years or longer, as compared with 11.8 percent of nondisabling cases. Corresponding figures for the other diagnoses for disabling and

nondisabling, respectively, were: nephritis, 3.6 and 10.6 percent; cardiovascular-renal, 3.4 and 8.0 percent; and hypertension, the smallest difference, 2.1 and 3.3 percent. These comparisons were true for males and females taken separately, but the percentages of 10- and 20-year cases were slightly higher for females than males.

Calls by Physicians

Mean Total Calls per Case

Of all the cases with 7 or more consecutive days of disability, 88 to 90 percent in the three diagnosis groups had one or more calls by a doctor (including clinic calls) during the study year (table 13). However, the mean number of calls was not large [10] Considering all cases of 7 or more days of disability the average number of calls during the year ranged from 12 to 14 per case which had one or more calls. With an average duration for heart diseases of 136 days of disability during the year, 13.7 calls would mean an average of about one call every 10 days of disability. Of course, what really happens is that there are a number of calls in the serious stages of the attack with little or no attention at other times.

As already noted, the cases with onset of disability prior to the study year had the longest duration of disability within the study year, and they had the largest number of calls, averaging 19 to 21 for the three diagnoses. Cases with an onset of disability during the study year averaged about one-half of the number of calls for those with prior onset. Although a smaller average number of days of disability would account for part of this situation, the large number of such attacks that were fatal within the first 24 hours would also account for fewer calls by doctors. In terms of disability, the heart attacks with onset within the year averaged a little less than one-fourth of the days of disability within the study year for cases with onset of disability prior to the study year. Thus the frequency of calls in relation to the average days of disability was greater for new attacks than for the older cases that entered the study in a disabled condition.

The average number of calls per case with one or more calls tends to increase slightly with age, but there are many exceptions.

Mean Home Calls per Case

A high proportion of the severe cardiovascular-renal cases had home calls by a doctor. Of all the heart cases with 7 or more consecutive days of disability, 72 percent had one or more home calls; hypertension cases, 74 percent; nephritis cases, 67 percent; and the total cardio-

[10] Calls by the full-time hospital staff were not recorded in this survey because of the difficulty of getting any estimate of such calls. However, such cases are counted in table 1 as attended cases.

vascular-renal group, 71 percent. In general more females had home calls than males; 77 percent of the heart and 77 percent of the hypertension female patients had one or more home calls, as compared with 67 and 70 percent, respectively, of the male patients. As age increased the proportion of heart patients who had a home call

Table 13. *Mean calls by doctor during study year per case of specified diagnosis and type—canvassed families in 83 cities and towns in 18 States, 1935–36*

[Cases disabled for 7 consecutive days or longer [1] during study year]

	Total cases of given type				Cases with onset within study year			
	Heart disease	Hypertension	Nephritis	Cardiovascular-renal	Heart disease	Hypertension	Nephritis	Cardiovascular-renal
Cases with any calls: [2]								
All ages:								
Both sexes	13.7	12.6	12.0	12.6	10.7	10.3	9.7	10.2
Male	14.0	13.1	12.6	13.1	10.7	10.6	10.2	10.5
Female	13.4	12.2	11.5	12.3	10.7	10.0	9.4	10.0
Both sexes:								
Under 20	11.8	10.9	9.6	10.7	10.1	10.2	8.8	9.5
20–44	13.0	12.1	10.6	11.7	9.9	9.5	8.8	9.3
45–64	14.9	13.6	13.1	13.6	11.5	10.9	10.0	10.8
65 and over	13.1	11.9	13.4	12.4	10.4	9.9	11.1	10.2
Cases with home calls:								
All ages:								
Both sexes	11.8	10.9	10.2	10.8	9.6	9.2	8.3	9.1
Male	11.8	11.1	10.7	11.0	9.6	9.4	8.8	9.2
Female	11.8	10.8	9.8	10.7	9.7	9.1	7.9	8.9
Both sexes:								
Under 20	11.1	11.3	8.0	9.7	9.4	10.9	7.5	8.6
20–44	10.0	8.7	7.3	8.5	7.9	7.1	6.2	7.0
45–64	12.5	11.2	11.2	11.3	10.1	9.3	8.6	9.4
65 and over	11.9	11.0	12.3	11.4	9.9	9.4	10.5	9.7

	Cases with onset prior to study year				Percent of 7 or more day cases [1] which had 1 or more calls during year			
	Heart disease	Hypertension	Nephritis	Cardiovascular-renal	Heart disease	Hypertension	Nephritis	Cardiovascular-renal
Cases with any calls: [2]								
All ages:								
Both sexes	21.1	19.5	20.7	20.0	89.7	89.4	8.84	88.8
Male	20.6	18.8	20.0	19.4	87.2	87.5	87.9	86.8
Female	21.7	20.1	21.5	20.6	92.2	90.9	88.8	90.5
Both sexes:								
Under 20	17.6	15.5	18.4	17.1	86.3	77.1	89.7	86.7
20–44	21.9	22.5	22.7	21.7	87.4	84.5	86.8	86.4
45–64	23.4	22.0	23.7	22.2	89.7	89.2	88.5	88.9
65 and over	19.1	17.3	18.0	17.8	91.5	91.1	89.4	90.4
Cases with home calls:								
All ages:								
Both sexes	18.1	16.4	17.3	16.7	72.1	74.1	67.4	70.8
Male	17.3	15.6	16.5	16.0	66.9	69.9	64.1	66.1
Female	19.0	17.1	18.2	17.5	77.1	77.1	70.2	74.7
Both sexes:								
Under 20	17.3	14.6	13.2	15.6	63.2	46.7	64.0	61.7
20–44	17.3	16.8	14.9	16.1	61.2	58.4	58.3	59.4
45–64	19.6	17.6	20.9	18.0	70.3	70.4	68.9	69.4
65 and over	17.2	15.6	16.1	16.1	80.5	81.4	77.0	79.5

[1] Includes cases disabled on the day of the visit, deaths before the seventh day, and hospital cases disabled for less than 7 consecutive days.

[2] Includes clinic cases but excludes hospital in-patients with care by full-time hospital staff only. Figures given elsewhere (table 1) for percentages with any attendant include such hospital cases.

increased from 63 and 61 percent for the two age groups under 45 years to 81 percent for those 65 and over. Hypertension increased regularly from 47 percent with a home call for patients under 20 years to 81 percent for those 65 and over. Nephritis, like heart disease, showed a higher percentage with home calls for patients under 20 years than at 20–44 but otherwise showed a regular increase with age.

For the group of patients who had home calls, the mean number during the year was not greatly different from total calls. In heart cases those with one or more home calls had an average of 11.8 during the year, as compared with 13.7 total calls for heart patients. Similar figures for hypertension are 10.9 home calls per case as compared with 12.6 total calls, and for nephritis 10.2 home calls per case as compared with 12.0 total calls. The nearness of these two figures does not indicate that most of the calls were home calls but rather that the severe cases with home calls had about as many such calls as the average for all home and office calls for the whole group of patients.

Of the total calls by doctors during the study year for heart patients with 7 or more consecutive days of disability, 69 percent were home calls. Corresponding percentages for the other diagnosis groups were: hypertension 72, nephritis 65, and for the whole cardiovascular-renal group 68 percent.

Distribution of Cases According to Calls

Table 14 shows distributions of cases disabling for 7 consecutive days or longer according to the number of doctors' calls received during the study year. The averages are fairly small and there is great variability around those means. Of the total heart cases, 8 percent received 40 or more calls, but 14 percent received only 1 call and another 10 percent had no calls. Of the total hypertension cases, 7 percent had 40 or more calls, and 14 percent had only 1 call; and of the total nephritis cases, 6 percent had 40 or more calls, and 12 percent had only 1 call. Sudden deaths and cases attended only by the full-time hospital staff may account at least in part for the cases with no calls. (See footnote 10 for details.)

Table 14 shows also the distribution of patients according to the number of home calls which they had during the year. Of all heart patients with 7 consecutive days or more of disability, 28 percent had no home calls and another 13 percent had only one home call. On the other hand, 26 percent had 9 or more home calls, and 5 percent had 40 or more home calls during the year. The figures for hypertension are practically the same as for heart disease. However, more nephritis cases had a smaller number of home calls; 33 percent had none, and 12 percent had only one home call; but 21 percent had 9 or more calls, and 4 percent had 40 or more home calls.

Table 14. *Distribution of cases of the specified diagnosis according to total and home calls by doctor during the study year—canvassed families in 83 cities and towns in 18 States, 1935–36*

[All cases disabled for 7 consecutive days or longer [1] during year]

Number of calls	Total calls [2] by doctor (clinic, office, home)				Home calls by doctor			
	Heart disease	Hyper-tension	Neph-ritis	Cardio-vascular-renal	Heart disease	Hyper-tension	Neph-ritis	Cardio-vascular-renal
Number of cases								
Total [3]	17,782	14,138	6,904	32,209	17,782	14,138	6,904	32,209
None	1,827	1,494	801	3,593	4,965	3,666	2,249	9,413
1	2,525	1,916	827	4,379	2,359	1,856	815	4,199
2	1,471	1,207	678	2,866	1,449	1,273	646	2,860
3	1,262	1,130	591	2,530	1,222	1,032	519	2,315
4	1,148	935	489	2,138	1,024	835	408	1,853
5	837	688	382	1,543	654	642	262	1,270
6–8	1,953	1,619	799	3,660	1,476	1,190	534	2,602
9–11	1,159	1,013	484	2,169	908	808	331	1,632
12–14	1,088	889	352	1,919	710	613	228	1,254
15–19	990	779	347	1,738	612	506	193	1,055
20–24	907	642	313	1,513	681	485	212	1,100
25–29	532	358	188	867	332	224	119	516
30–39	634	491	230	1,063	437	329	122	684
40–59	800	555	240	1,282	502	386	144	811
60 or more	649	422	183	949	451	293	122	645
Percent of cases								
None	10.3	10.6	11.6	11.2	27.9	25.9	32.6	29.2
Only 1	14.2	13.6	12.0	13.6	13.3	13.1	11.8	13.0
2–8	37.5	39.5	42.6	39.5	32.8	35.2	34.3	33.8
9 or more	38.0	36.4	33.8	35.7	26.1	25.8	21.3	23.9
40 or more	8.1	6.9	6.1	6.9	5.4	4.8	3.9	4.5

[1] Includes cases disabled on the day of the visit, deaths before the 7th day, and hospital cases disabled for less than 7 consecutive days.
[2] Clinic calls are counted like any other calls; in-patients attended by full-time hospital staff only are counted as having no calls; all such calls are excluded from the whole table.
[3] Excludes a few cases unknown as to whether there were calls.

Seasonal Variability

Figure 13 illustrates the seasonal variability in cardiovascular-renal cases and deaths (table 15). The cases are confined to those with the onset of disability within the study year and are classified according to the month of onset of disability. Because of considerable random fluctuations, the data as plotted in this chart are three-period moving averages of the percentages of cases in each month, all months being reduced to a 30-day basis. Table 15 shows actual percentages before moving averages were applied. On the left of figure 13 it may be seen that there is considerable seasonal variation in the onset of disability in cases, but there is little difference between heart, hypertension, and nephritis in this respect. In all three diseases the peak of the cases comes in December or January with May to August representing the lowest part of the curves.

Just below the case data in figure 13 are deaths for the entire United States plotted on the same basis; the deaths are classified by month of death rather than month of onset of disability. Again the seasonal pattern of the three diseases is almost identical, but the monthly

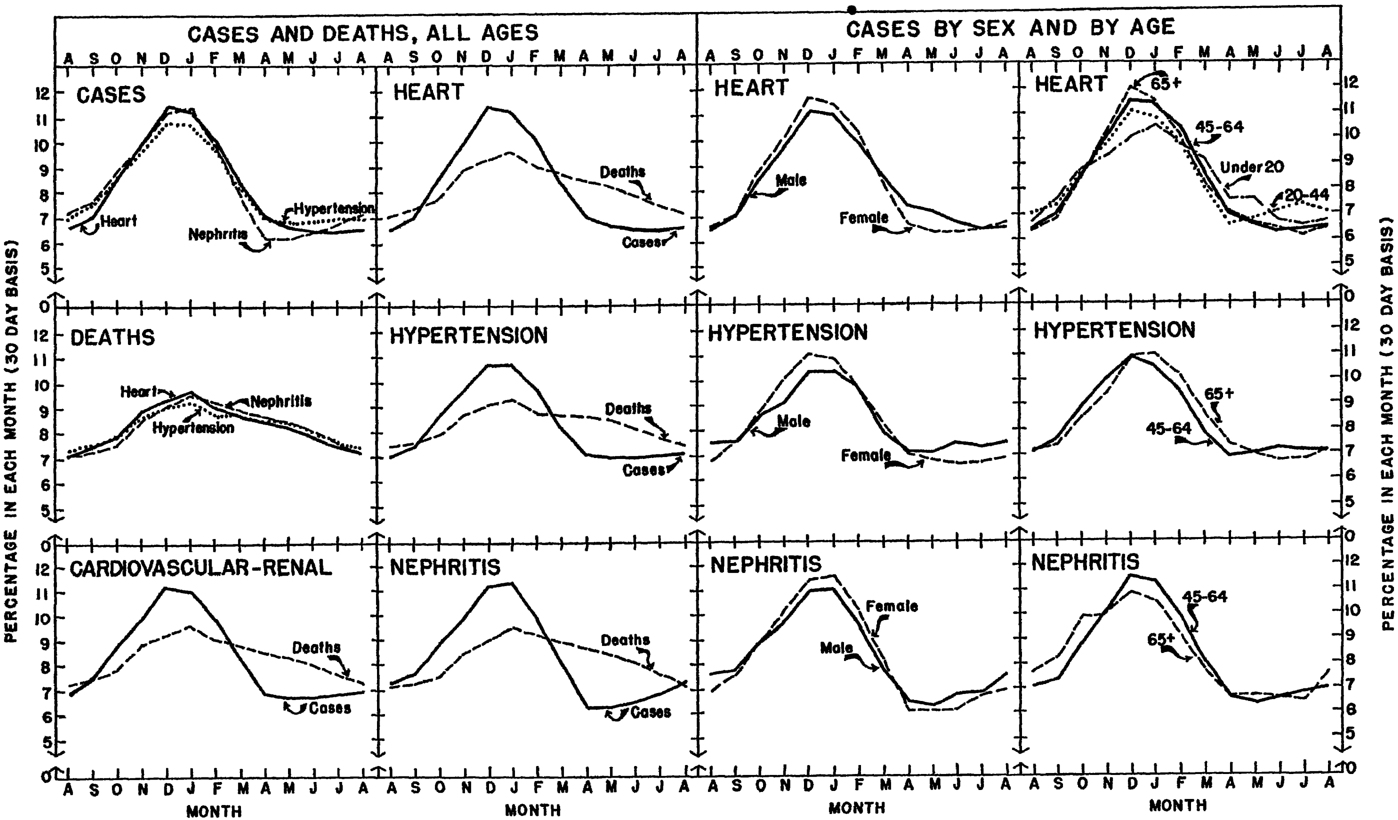

Figure 13. Seasonal variation in onset of disability of survey cases with disability beginning during the study year (1935–36), and of deaths registered in the United States, 1945 (data plotted are 3-period moving averages of actual monthly percentages, 30-day basis, in table 15).

variation in deaths is considerably less than in cases. The seasonal variation in heart deaths ranges from 7.2 percent occurring in August to 9.6 in the peak month of January. This may be compared with a variation in heart cases from a low of 6.4 in July to a peak of 11 5 percent in December.

The right half of figure 13 compares the seasonal variation of cases among males and females, and of cases at different ages. With respect to sex there appear to be no large differences, but in each of the three diseases there is somewhat more seasonal variability among females than males. With respect to age, in heart disease the ages under 20 years show the least seasonal variability and the ages above 45 show the greatest variability, the ages 20–44 years being somewhat intermediate. Moreover, the peak for the age group under 20 years comes in January, whereas the peak in the other three curves comes in December. Heart disease under 20 years, except for congenital heart, would be largely rheumatic; a preceding study (*5*) indicated less seasonal variability in rheumatic heart deaths than in rheumatic fever cases.

The number of cases of hypertension and nephritis under 45 years was not sufficient to give reliable seasonal curves so that only the two age groups above 45 are shown. In hypertension the amount of seasonal variation is approximately the same for the two age-groups, but the curve for those 65 and over has a peak in January as compared with a December peak for those 45-64 years of age. Nephritis shows less seasonal variation in the oldest age group, but the peak comes in December for both ages.

Economic Status

A preceding publication based on this survey (*2*) included a study of the variation with family income in the volume of disability from a large number of diseases. Volume of disability refers to the days of disability due to the given disease per 1,000 surveyed population. Among the diagnoses was cardiovascular-renal diseases but without a break-down of the three diseases in the group. The age-adjusted disability rate for cardiovascular-renal diseases in the group of families on relief was 2.7 times the rate for families with an income of $3,000 or more. The rate for nonrelief families with an income of less than $1,000 was 1.6 times the rate for families with $3,000 and over. The other three income groups from $1,000 to $3,000 had rates that fell logically between the rates for these extremes.

For chronic diseases of the types included in the cardiovascular-renal group, the higher rates in the poorer groups are apparently due to a variety of circumstances. Considering all cases prevalent during the study year, the high disability rate in the low income and

Table 15. *Seasonal variation in heart disease, hypertension, nephritis, and cardiovascular-renal cases* [1] *in the surveyed population, and deaths* [1] *in the general population of the United States*

	Total cases		Percentage [2] in each month (30-day basis)											
	Number	Percent	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Heart disease														
Cases, onset within year:[1]														
All ages:														
Both sexes	12,531	100	12.4	10.1	7.8	7.1	6.1	6.9	6.5	5.9	7.3	7.9	10.8	11.1
Male	5,771	100	12.1	9.8	7.8	7.7	6.7	7.0	6.4	6.0	7.3	7.8	10.5	10.9
Female	6,760	100	12.7	10.2	7.8	6.7	5.5	6.7	6.6	5.9	7.3	8.0	11.1	11.3
Both sexes:														
Under 20	918	100	11.0	10.1	8.3	8.8	5.6	8.2	6.4	5.1	8.7	8.8	8.8	10.1
20–44	2,241	100	12.1	10.2	7.3	6.5	6.0	7.9	7.3	6.7	7.0	8.2	10.9	10.1
45–64	4,799	100	12.7	10.4	7.9	7.3	5.7	6.5	6.7	5.8	7.0	8.2	10.8	10.9
65 and over	4,573	100	12.6	9.6	7.8	6.9	6.5	6.5	6.1	5.8	7.5	7.3	11.2	12.1
Deaths in United States:[1]														
All ages; both sexes	424,328	100	9.2	9.1	8.7	8.3	8.3	8.0	7.3	7.1	7.2	8.0	8.3	10.5
Hypertension														
Cases, onset within year:[1]														
All ages:														
Both sexes	10,277	100	11.7	9.8	7.6	7.0	6.5	7.1	7.2	6.5	7.5	8.5	10.1	10.4
Male	4,072	100	12.1	9.4	7.7	6.8	6.8	7.6	8.1	6.3	8.0	8.3	9.4	9.6
Female	6,205	100	11.5	10.1	7.5	7.2	6.4	6.9	6.6	6.7	7.1	8.6	10.6	10.9
Both sexes:														
45–64	4,200	100	11.5	9.8	7.1	6.6	6.9	7.3	7.3	6.7	7.0	9.0	10.6	10.1
65 and over	4,753	100	12.3	9.9	8.1	7.5	6.5	6.6	6.7	6.4	7.9	7.8	9.6	10.5
Deaths in United States:[1]														
All ages; both sexes	129,144	100	9.0	8.8	8.5	8.8	8.4	8.2	7.5	7.3	7.3	8.0	8.3	9.8

	Total cases		Percentage [2] in each month (30-day basis)											
	Number	Percent	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Nephritis														
Cases, onset within year:[1]														
All ages:														
Both sexes	5,402	100	11.9	11.2	6.6	6.2	6.0	6.5	6.9	7.0	7.8	8.2	10.8	10.9
Male	2,327	100	11.5	10.5	6.8	5.9	6.7	6.6	7.3	6.8	8.7	7.9	10.3	11.1
Female	3,075	100	12.2	11.7	6.4	6.4	5.5	6.4	6.6	7.2	7.1	8.4	11.2	10.8
Both sexes:														
45–64	1,660	100	12.4	10.7	6.4	6.9	6.3	5.9	7.3	7.0	6.9	8.3	11.2	10.7
65 and over	1,231	100	10.8	9.8	6.6	6.6	6.7	6.5	6.5	6.3	10.2	8.2	11.0	10.8
Deaths in United States:[1]														
All ages; both sexes	88,078	100	9.4	9.4	8.9	8.4	8.7	8.2	7.4	7.1	7.0	7.8	8.0	9.7
Cardiovascular-renal diseases														
Cases, onset within year:[1]														
All ages:														
Both sexes	23,744	100	12.0	10.2	7.5	6.8	6.1	7.0	6.8	6.5	7.4	8.3	10.7	10.8
Male	10,181	100	11.6	9.9	7.6	7.0	6.5	7.4	6.9	6.4	7.7	8.2	10.4	10.4
Female	13,563	100	12.2	10.4	7.4	6.7	5.8	6.7	6.6	6.6	7.1	8.4	10.9	11.1
Both sexes:														
Under 20	1,783	100	11.8	11.1	7.2	8.3	5.8	7.9	5.9	5.6	8.6	8.3	9.2	10.3
20–44	4,760	100	11.7	10.5	7.0	5.9	5.6	7.4	7.4	7.3	7.0	8.6	10.8	10.7
45–64	8,887	100	11.9	10.2	7.4	6.9	6.1	6.9	7.1	6.7	6.8	8.7	10.9	10.4
65 and over	8,314	100	12.2	9.8	7.9	7.0	6.4	6.7	6.2	6.1	8.0	7.8	10.7	11.3
Deaths in United States:[1]														
All ages; both sexes	641,550	100	9.2	9.1	8.7	8.4	8.4	8.1	7.3	7.1	7.2	8.0	8.3	10.2

[1] Cases include only those with onset of disability within the study year 1935–36, classified by month of onset of disability; deaths are for 1945, and are classified by month of death.

[2] Percentages in this table are unsmoothed, but those plotted in figure 13 are 3-period moving averages of these percentages.

relief groups is undoubtedly due in part to loss of income resulting from the presence of the disease, particularly if the wage-earner of the family is the patient. Thus, the chronic disease caused the low income rather than otherwise. On the other hand, occupations involving hard labor would play a part in causing greater disability from heart and related diseases in the lower income groups both as a result of greater strain on the normal heart and as a result of more frequent inability to be about their usual occupations than in the case of desk workers for whom the physical strain is a minimum.

Summary

Although heart disease and other cardiovascular-renal diseases are easily the most important causes of death in the United States, there are few detailed morbidity data on these diseases. Therefore, it seemed worth while to analyze such data from the National Health Survey of 1935–36 in the light of present-day mortality data, and to estimate the numbers of cases of the different diseases in the United States.

The National Health Survey of 1935–36 covered 2,500,000 persons by house-to-house canvass and recorded a total of 93,733 cardiovascular-renal cases, both disabling and nondisabling. For purposes of analysis these cases are divided into heart disease, hypertension, and nephritis. Each group includes all persons who were reported as having the given disease, but the cardiovascular-renal total represents an unduplicated count by excluding patients who had two or more of the three diseases from all but the disease considered to be the principal cause of the illness.

Each of the diseases is divided into several categories, including cases disabling for 7 consecutive days or longer, subdivided into those with (*a*) onset of disability prior to the study; (*b*) onset of disability within the study year but with a history of a previous attack; and (*c*) new cases with no history of any previous experience with the disease. In the disabling group there is also a small number of cases that were not disabled as much as 7 consecutive days during the year, but suffered intermittent disabilities of less than 7 consecutive days. The remainder of the cases represent those without disability during the study year, subdivided into those with (*a*) some restriction of their activities with respect to the type of work they could do, and (*b*) no disability and no restriction of activity.

Case rates for hypertension show the greatest variation with age and those for nephritis the least variation with age (fig. 3).

Relative age curves for all disabling cases and for new cases (no history of previous attack) of 7 or more consecutive days of disability are not greatly different, but the level of the rates is quite different.

These two categories and also the death rates increase to a maximum at the oldest ages—85 years and over. The nondisabling cases decrease in the oldest ages, presumably because more of them progress into the severe disabling category which continues to a maximum at the oldest ages. Cases with some restriction of activity but not actually disabled, and those with intermittent disabilities of less than 7 consecutive days also decrease in the oldest ages (fig. 4).

Considering the relative importance of the three specific diagnoses in the whole cardiovascular-renal group, heart disease, particularly in the middle and older ages, is considerably more important as a cause of mortality than as a cause of morbidity. Considering specific ages, the proportion of the total cardiovascular-renal category that is charged to nephritis is not extremely different for illness and mortality; however, hypertension is relatively less important as a cause of death than as a cause of illness (figs. 1 and 2).

Hypertension shows the largest percentage of cases that were without disability or restriction of activity throughout the study year, and nephritis shows the smallest proportion of cases in this nondisabling category (figs. 5, 6, 7, and 8).

The total recorded case rates (disabling and nondisabling) are considerably higher among females than males. The relative excess of the female rate is less for the 7-day disabling cases than for the total; for new cases disabling for 7 consecutive days or longer, the rates for males are consistently above those for females in the older adult ages. The above applies particularly to heart disease and nephritis, although hypertension rates tend to vary in the same way (fig. 9).

Death rates for heart disease, based on registered deaths in the entire United States in 1945 and 1946, are definitely and consistently higher for males than females above the age of 15 years; the maximum relative difference occurs at 50–54 years with a gradual decrease in the relative excess of rates for males above and below those ages. For hypertension, the sex differences in the rates are definitely less and not consistent in the several age groups. For nephritis, the differences are not consistent until about 45 years of age after which males have moderately and consistently higher rates than females (fig. 10).

The proportion of heart disease and hypertension deaths that occurred within 24 hours of the onset of the disabling attack amounted to 21 and 16 percent, respectively, for persons of all ages and both sexes. The proportion of sudden heart deaths was definitely higher for males than females but both curves reached a peak at 45–54 years of age, with a high percentage also among children under 5 years of age (fig. 11).

Considering cases with the onset of disability within the study year, there was more seasonal variation in the cases of each diagnosis than in the deaths from the same diagnosis. The seasonal variation did not differ greatly for males and females or in the several age groups (fig. 13).

ACKNOWLEDGMENT

The author is indebted to Principal Biostatistician T. D. Woolsey for advice in the preparation of this paper and to Assistant Biostatistician Katharine Trantham and Mrs. Lucile Hayden for supervision of the tabulations and computations.

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APPENDIX

Completeness of Cardiovascular-renal Cases as Recorded in the National Health Survey

In a group of 10 cities [11] of 100,000 or more population, a detailed tabulation of National Health Survey data was made to compare the diagnosis as reported by the household informant with that supplied by the attending physician, clinic, or hospital on a special form of inquiry sent to such attendants. There were 16 special forms of this kind, the one sent depending upon the diagnosis reported by the family. The questions included more than a request to state whether the family diagnosis was correct. Every form asked also for any complicating diagnoses. Furthermore, many of the forms for chronic disease had queries about the presence of other specific diagnoses and complications. Thus, the form for heart, hypertension, and arteriosclerosis cases included specific questions about the presence of all three of these conditions and also about cerebral hemorrhage and nephritis. Similar questions appeared on the form for nephritis and kidney diseases about the presence of heart disease, hypertension, arteriosclerosis, and other complications.

[11] Boston, New York City, Syracuse, Cleveland, Minneapolis, St Louis, Birmingham, Salt Lake City, Los Angeles, and Portland, Oreg.

A comparison of the informant's report and the doctor's diagnosis for cases on which medical reports were returned with sufficient information for coding revealed the following: For heart disease (all types combined) the physicians indicated in 91 percent of such diagnoses that the report was correct; for the hypertension group the reports indicated that 93 percent were correct, but for nephritis and kidney diseases only 68 percent were indicated as correct. Considering all three diagnoses grouped in this study as cardiovascular-renal diseases, 89 percent of the sample of cases on which codable reports were received were indicated as the correct diagnosis.

If the question of diagnosis is carried further to indicate for heart cases whether the particular type of heart disease was correctly specified, the percentage correct was much smaller. However, it would not be expected that the family informant would be able to report whether the heart condition was arteriosclerotic, hypertensive, congenital, syphilitic, or thyrotoxic, nor to be able to report whether the manifestation was endocarditis, myocarditis, pericarditis, coronary disease, or some other category. For these and other reasons the study is confined entirely to heart diseases of all types combined. Rheumatic heart disease, chiefly among children, has been considered in an earlier publication (*5*), but heart cases of rheumatic origin are also included in the present study.

The data from these medical reports are useful in another important respect, namely, to estimate the completeness of the reports of these chronic cardiovascular-renal diseases. As noted above, the medical attendant for the case was asked to indicate not only whether the diagnosis was correct, but also to add any other diagnoses and complications for this particular patient, the important and frequent complications being requested by name. For chronic cardiovascular-renal diseases this meant, for example, that a physician might have added to a report for heart disease that the patient also had hypertension, or nephritis, or both; such additional chronic disease reports may have been listed also for acute diseases if the patient failed to report the chronic condition. These added diagnoses for heart disease, hypertension, and nephritis were tabulated from the codable medical reports received in the 10 large cities and were found to constitute rather large proportions of the respective diagnoses reported by the family. For heart disease the additional reports of that diagnosis amounted to 66 percent of the 2,902 heart cases reported by the family and with codable reports returned by the medical attendants.

Some further detail should be given about medical reports. Requests for such information were sent to medical attendants for all cases attended within 12 months of the canvass, unless permission for such requests had been refused by the family; refusals amounted to only a few percent of all schedules. Fol-

lowing is a summary of the raw data on cases of cardiovascular-renal diseases in the 10 large cities for which medical reports were used in the coding.

Diagnosis	Numbers in the 10 large cities						
	Cases for which confirmation was requested	Cases for which replies were received	Replies usable in coding	Medical report		Total attended cases	Total cases reported by family
				Incorrect diagnosis	This diagnosis added to another report		
Heart disease	7,483	3,303	2,902	255	1,927	8,870	13,090
Hypertension	6,526	2,937	2,441	160	1,907	7 967	12,255
Nephritis	2,217	896	831	266	735	2,667	3,988
Total, cardiovascular-renal	16,226	7,136	6,174	681	4,569	19,504	29,333

A few percentages based on this table may be worth examination. Considering for the 10 large cities all cardiovascular-renal diagnoses for which data were requested from the attendant, 44 percent were returned (40 to 45 in the three diagnoses); of those returned, 87 percent were sufficiently clear and complete to use in coding (83 to 93 in the three diagnoses). This means a return of 38 percent when only usable reports are considered (37 to 39 percent for the three diagnoses). About two-thirds of the total cases were attended sometime during the study year (nearly the same for each diagnosis). For 83 percent of these attended cases, a request for confirmation was sent to the medical attendant (82 to 84 percent for the three diagnoses). The replies to these requests amounted to 37 percent of all attended cases, but the usable reports consisted of 32 percent of all attended cases (31 to 33 percent for the three diagnoses) or, as noted above, 87 percent of the replies received.

Although these data may be biased in several ways, in the absence of other closely related data they seem to afford the best method of making a rough estimate of incompleteness of recording of these cardiovascular-renal cases in the survey.

However, some of the medical reports indicated that heart disease reported by the family was not the correct diagnosis. Therefore, before using these added diagnoses to compute a factor for correcting for under-reporting, diagnoses indicated by the medical attendant as incorrect were subtracted and the factor became a net correction which took account of heart cases reported by the family but not confirmed by the attending physician's report. This net correction indicated that an addition for heart disease of 58 percent of the cases reported by the family was needed to correct for under-reporting. As a result of further correction to take account of the fact that medical reports were not received for all cases in the 10 large cities and that the added diagnoses for the medical reports that were received were already counted in the total cases, the correction factor for heart cases was further reduced to 54 percent. Considering also the other diagnoses

under study in this paper, the net correction factors [12] (changed to multipliers to be applied to family reports to correct for incompleteness) were as follows: Heart diseases, 1.54; hypertension, 1.67; nephritis, 1.53; and the total cardiovascular-renal group, 1.58.

Although the unreported cases were numerous, they were probably in large part the milder ones with little or no disability during the year. No corrections are attempted in this paper except for the total cases of all ages and of all degrees of severity. The following table gives the results of applying these correction factors for incompleteness to the rates recorded in this survey, and then applying the corrected rates to the estimated population of the United States of 149,200,000 as of July 1, 1949.

Recorded and estimated rates and numbers of prevalent cases of cardiovascular-rena

	Heart disease	Hyper-tension	Nephritis	Total cardio-vascular-renal (unduplicated)
Recorded case prevalence per 100,000 population in National Health Survey, 1936	1,910	1,877	597	3,769
Correction for incompleteness of family reports, based on doctors' reports	1.54	1.67	1.53	1.58
Estimated corrected case prevalence per 100,000 population at time of National Health Survey, 1936	2,941	3,135	913	5,955
Correction factor for trend since 1936, based on U. S. death rates 1936–46	1.15	0.99	0.70	1.03
Estimated case prevalence per 100,000 in 1949	3,382	3,104	639	6,134
Estimated total cases prevalent in U. S. in 1949	5,000,000	4,600,000	950,000	9,200,000

Even with these large corrections for under-enumeration, the estimated case rates for these diseases fall considerably below findings based on medical examinations. In the first place, there are many persons with heart and cardiovascular-renal diseases of a mild type who themselves do not know of its existence, and probably many other cases that are not known to the family even when known to the afflicted person. Therefore, it seems worth while to compare rates found in this house-to-house canvass, corrected for under-reporting as indicated above, with those found by medical examination in several such studies. Prevalence rates for the health survey are computed in 5-year age groups, and the same is true of most of the physical exam-

[12] Corrections for incompleteness of reporting of cases in the National Health Survey by an entirely different method were made by Hailman (*18*) in a report on all chronic diseases. In that study death rates from specific diseases as recorded in the health survey and as registered in the United States for the year 1937 were compared for the three diseases here under consideration and others with high mortality rates. It was assumed that the case rates as recorded in the house-to-house canvass were as incomplete as the death rates so recorded, when the latter were compared with the registered death rates in the United States as a whole. This entirely different method produced the following figures for correction factors for incompleteness of reporting of cases for the several diagnoses—heart disease, 1.49; hypertension, 1.52; nephritis, 1.68; and cardiovascular-renal as a whole, 1.53. Thus the two sets of correction factors based on entirely different methods and assumptions are of the same order of magnitude, those based on physicians' reports being somewhat larger.

ination rates except that fewer age-groups are shown for the ages above 60 years. In the following comparisons the quoted rates represent simple averages of rates for the 5-year age groups included in the specified age span.

Among the older physical examination studies are those of the Life Extension Institute representing medical examinations of policyholders [13] after they had been insured for a number of years. An analysis of the results of the examination of about 100,000 males 20 years of age or older was made by Sydenstricker and Britten (*16*). These examinations were reported in two different groups—one made at the headquarters office of the Life Extension Institute in New York City where special equipment and detailed examinations were the rule, and the other made in all other places, designated in the study as "Field." Comparisons made here refer to the two groups combined. A simple average of the ten 5 year age-groups from 20 to 69 years indicated that 4.6 percent of those examined had organic heart diseases. This figure may be compared with 3.8 percent for the family canvass data computed in a similar way for males of the same age groups but corrected for underreporting. The Life Extension figure does not include enlarged heart or irregular and other functional heart diseases. The results of the Life Extension Institute examinations are reported in 7 different diagnoses that are included as organic heart disease, so that the total may contain some overlapping in that the same individual may have been reported as having two or more organic heart conditions.

With respect to broad age groups, the Life Extension examinations indicated 2.8 percent of males with organic heart disease at 20–44 and 6.3 at 45–69, as compared with 1.3 and 6.4 percent for the respective age groups in the family canvass data, corrected for underreporting.

A study of the results of medical examinations of 10,000 male industrial workers by Britten and Thompson (*3*) indicated an average organic heart disease rate of 4.2 percent for the ages 20–59 as compared with 2.4 percent for males of the ages 20–59 in the family canvass data, corrected for underreporting. The industrial data exclude enlarged heart and irregular and other functional heart diseases. Similar averages for organic heart among male industrial workers of the ages 20–44 and 45–59 were 3.3 and 5.7 percent, as compared with 1.3 and 4.1 percent for males of the respective ages in the family canvasses. These workers were in 10 different industries and data are available on organic heart in 7 of them. In these

[13] These examinations do not include the original one to determine whether the applicant was acceptable for insurance.

7 industries the rates for organic heart disease for the ages 20–59 (average of 10-year age groups) ranged from 2.5 to 5.9 percent.

A more recent study was made of Farm Security Administration borrowers and their families (*13*) which indicated, as an average for the twelve 5-year age groups, rates for heart disease for males of the ages under 60 years of approximately 10.1 percent. The corresponding hypertension rate was 10.0 percent as set down by the examining physician and 10.7 percent as measured by blood pressure of 150 or more, systolic, and 90 or more, diastolic. All of these rates are considerably above the findings of the household canvass for the same ages, even after correction for underreporting, 1.8 and 1.4 percent for heart and hypertension, respectively.

Thus it is seen that rates found in this family canvass study are below findings of these medical examination studies with the aid of such instruments and tèchniques as the stethoscope, sphygmomanometer, urinalysis, and other more accurate tests for the presence of heart disease, hypertension, and nephritis. Again, one would not expect to find as many cases in household surveys as by medical examination. However, the great majority of the cases found in the survey represent individuals who were considerably disabled during the study year or at some fairly recent time in their lives. Approximately half of the recorded cases represent patients who were, during the study year, so sick as to be unable to work or carry on other usual activities for a period of 7 consecutive days or longer; thus they represent, in the main, severe disabling sickness rather than murmurs and signs of heart disease that had not yet given the patient serious trouble.

Although the most recent data on medical examination findings are those from the Selective Service (*15*), they are restricted to such a narrow age range that comparison must be limited to those few ages. Insofar as comparable diagnoses were obtainable, it appears that the Selective Service reports indicated rates far above the family canvass data.

Some further comparisons of rates and of sex differences in rates were discussed in the body of this report and need not be repeated here.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 29, 1949

A total of 1,071 cases of poliomyelitis was reported for the week, a decline of 77 cases (7 percent), as compared with last week's decline of 59 cases (5 percent), and 248 cases (23 percent), for the corresponding week last year. The corresponding 5-year (1944–48) median total was 581 cases. A combined increase of 48 cases was reported this week in the New England, Middle Atlantic, South Atlantic, and East South Central areas, all of which, however, last week reported a combined decline of 64 cases. The 17 States reporting currently more than 20 cases are as follows (last week's figures in parentheses): *Increases*—Connecticut 34 (17), New York 152 (138), Pennsylvania 39 (36), Ohio 57 (52), Indiana 29 (22), Minnesota 62 (40), Maryland 24 (14), Kentucky 29 (18), Tennessee 22 (15); *decreases*—Massachusetts 45 (51), New Jersey 52 (58), Illinois 53 (63), Michigan 50 (67), Wisconsin 38 (43), Oklahoma 23 (31), Texas 35 (57), California 68 (98).

The total for the year to date is 38,153, as compared with 23,418 for the same period last year and a 5-year median of 17,437. The 8 States reporting the largest numbers for the 32-week period since March 19 are as follows (last year's corresponding figures in parentheses): New York 5,052 (1,285), Illinois 2,689 (1,006), Michigan 2,548 (656), Texas 2,032 (1,590), California 1,866 (4,118), Minnesota 1,739 (1,153), Massachusetts 1,705 (178), Ohio 1,655 (1,065).

During the week, New York and Pennsylvania reported 1 case each of anthrax, West Virginia 1 case of rabies in man, and California 1 case each of psittacosis and relapsing fever.

Cumulative figures (other than for poliomyelitis) since the respective weeks of seasonal low incidence are below the corresponding 5-year medians for all of the 9 diseases for which data are available, and since the first of the year for all except infectious encephalitis, measles, poliomyelitis, Rocky Mountain spotted fever, and tularemia.

Deaths recorded during the week in 94 large cities in the United States totaled 9,068, as compared with 8,887 last week, 9,152 for the corresponding week last year, and a 3-year (1946–48) median of 8,928. The total for the year to date is 393,581, corresponding period last year 395,095. The cumulative figure is 28,120, corresponding period last year 28,701.

Telegraphic case reports from State health officers for the week ended October 29, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [c]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	------	------	------	21	------	1	6	------	6	------	------	------	3	------
New Hampshire	------	------	------	------	------	------	3	------	------	------	------	------	------	------
Vermont	------	------	------	1	------	------	10	------	2	------	------	------	7	------
Massachusetts	4	------	------	26	2	------	45	------	30	------	------	------	95	------
Rhode Island	------	------	------	------	------	6	6	------	7	------	------	------	14	------
Connecticut	------	------	------	23	2	23	34	------	13	------	------	1	61	------
MIDDLE ATLANTIC														
New York	9	1	[e] 1	30	4	160	152	------	[d] 37	------	------	------	187	11
New Jersey	1	------	5	14	3	52	52	------	13	------	------	------	126	1
Pennsylvania	3	------	------	33	7	55	39	------	23	------	------	3	152	2
EAST NORTH CENTRAL														
Ohio	3	------	3	14	5	63	57	------	99	------	1	6	82	6
Indiana	6	------	5	8	2	3	29	------	19	------	------	------	15	15
Illinois	1	2	4	13	6	119	53	------	21	------	------	1	110	2
Michigan [a]	2	2	2	71	4	23	50	------	45	------	------	3	77	3
Wisconsin	2	------	7	27	------	3	38	------	28	------	------	1	50	------
WEST NORTH CENTRAL														
Minnesota	4	------	------	10	------	2	62	------	15	------	------	------	6	------
Iowa	------	------	------	18	1	1	12	------	10	------	------	------	2	1
Missouri	3	------	1	1	------	2	19	------	8	------	------	3	7	------
North Dakota	------	------	1	4	------	------	2	------	------	------	------	------	3	------
South Dakota	------	1	------	7	1	------	12	------	------	------	------	------	------	------
Nebraska	------	------	9	6	------	3	19	------	11	------	------	------	1	------
Kansas	------	------	------	4	------	12	16	------	23	------	1	1	18	------
SOUTH ATLANTIC														
Delaware	------	------	------	1	------	------	------	------	10	------	------	------	8	------
Maryland [a]	4	------	1	19	------	20	24	------	11	------	------	------	40	------
District of Columbia	1	------	------	5	1	11	7	------	7	------	------	------	------	------
Virginia	9	------	147	6	------	46	9	------	18	------	------	1	17	4
West Virginia	6	------	12	4	2	3	6	------	14	------	------	3	14	------
North Carolina	31	------	------	6	1	------	1	1	76	------	1	------	23	------
South Carolina	13	------	10	4	------	10	1	------	6	------	------	1	1	1
Georgia	22	------	1	1	1	9	9	------	30	------	------	1	2	10
Florida	2	------	2	12	------	13	8	------	3	------	1	1	6	------

EAST SOUTH CENTRAL														
Kentucky	30	...	1	4	4	97	29	1	57	...	...	3	4	14
Tennessee	12	1	15	6	1	31	22	...	62	...	...	1	33	...
Alabama	21	...	3	6	1	23	6	...	24	...	1	1	10	7
Mississippi [a]	17	...	1	3	1	14	3	...	13	...	1	2	6	...
WEST SOUTH CENTRAL														
Arkansas	3	...	47	3	2	29	13	...	2	...	1	1	15	...
Louisiana	6	...	...	1	...	19	2	...	4	...	...	2	1	...
Oklahoma	5	...	62	3	1	18	23	...	9	...	1	1	7	1
Texas	15	6	939	18	7	233	35	...	21	...	2	8	59	8
MOUNTAIN														
Montana	...	...	5	34	1	...	4	...	4	...	1	1	3	...
Idaho	...	...	21	3	...	5	17	...	[d] 17	...	...		3	...
Wyoming	...	...	...	11	...	...	1	...	3	...	...	...	...	...
Colorado	1	1	21	5	1	20	19	...	12	...	...	1	2	...
New Mexico	...	...	...	2	...	5	3	...	2	...	...	1	5	...
Arizona	...	...	112	15	...	10	3	...	1	...	...	2	4	...
Utah [a]	...	...	...	57	...	1	12	...	...	...	...	...	16	...
Nevada	...	...	...	...	...	...	...	...	...	...	...	...	...	...
PACIFIC														
Washington	2	...	...	30	...	...	17	...	27	...	...	...	10	...
Oregon	1	...	5	6	...	11	13	...	18	...	...	1	17	...
California	12	2	15	41	5	27	68	...	[d] 69	...	...	9	93	...
Total	251	16	1,458	637	66	1,183	1,071	2	930	...	11	60	1,415	...
Median, 1944–48	401	12	1,576	1,190	77	...	581	1	1,666	6	8	74	1,620	...
Year to date 43 weeks	6,216	663	86,682	592,961	2,841	64,938	[1] 38,153	549	63,983	44	[1] 960	3,228	52,195	...
Median, 1944–48	10,257	543	201,458	560,009	5,079	...	17,437	507	96,107	301	775	3,535	82,058	...
Seasonal low week ends	(27th) July 9	...	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	...	(11th) Mar. 19	...	(32nd) Aug. 13	(35th) Sept. 3	...	(11th) Mar. 19	(39th) Oct. 1	...
Since seasonal low week	2,448	...	10,815	4,443	325	...	[1] 37,237	...	5,723	3	...	2,768	5,593	...
Median, 1944–45 to 1948–49 [b]	4,286	...	11,795	5,767	413	...	17,174	...	9,812	27	...	3,060	6,183	...

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods (1944–45 to 1948–49).
[c] New York City only.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately as follows: Ohio 1, Michigan 3, South Carolina 1, Georgia 1, Texas 3, California 4. Cases reported as salmonella infection, not included in the table, were as follows: Massachusetts 10, New York 2.
[1] Poliomyelitis—Deductions: Michigan, week ended September 24, 2 cases, week ended October 8, 1 case; Missouri, week ended October 15, 1 case; Arkansas, week ended July 23, 1 case. Tularemia—Deductions: Arkansas, weeks ended September 24, and October 15, 1 case each.

Anthrax: New York and Pennsylvania, 1 case each.
Psittacosis: California, 1 case.
Rabies in man: West Virginia, 1 case.
Relapsing fever: California, 1 case.

Alaska: Measles 3, pneumonia 6.
Hawaii Territory: Measles 3, scarlet fever 3, whooping cough 1.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended October 8, 1949.—During the week ended October 8, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			5	2	36	114	6	28	51	39	281
Diphtheria					3	6			3		12
Dysentery, bacillary					2	3	4				9
Encephalitis, infectious							4				4
German measles			2		3	8		1	11	2	27
Influenza			34			3	2				39
Measles			60		160	44	26	73	26	143	532
Meningitis, meningococcal			1	1	1	3					6
Mumps			10		21	50	5		13	53	152
Poliomyelitis			5		10	29	2	8	4	9	67
Scarlet fever				3	32	27	8	2	27	5	104
Tuberculosis (all forms)	8		5	12	80	23	13	12	12	36	201
Typhoid and paratyphoid fever					5				1	1	7
Undulant fever						1	2		2		5
Venereal diseases:											
Gonorrhea	5	1	13	4	101	76	24	8		71	303
Syphilis	5		6	4	47	22	7	14		6	111
Other forms										1	1
Whooping cough	2		1		50	32	3	1		4	93

JAPAN

Notifiable diseases—4 weeks ended September 24, 1949, and accumulated totals for the year to date.—For the 4 weeks ended September 24, 1949, and for the year to date, certain notifiable diseases were reported in Japan as follows:

Disease	4 weeks ended Sept. 24, 1949		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	595	46	10,448	1,042
Dysentery, unspecified	5,396	1,561	19,975	5,580
Encephalitis, Japanese "B"	826	258	913	288
Gonorrhea	14,755		138,256	
Influenza	45		1,871	
Malaria	375	7	3,349	47
Measles	2,550		156,949	
Meningitis, epidemic	189	57	1,200	346
Paratyphoid fever	245	16	1,788	79
Pneumonia	4,162		109,013	
Scarlet fever	192	2	3,392	51
Smallpox			120	12
Syphilis	13,425		146,437	
Tuberculosis	40,435		354,292	
Typhoid fever	779	92	4,947	599
Typhus fever	2	1	92	7
Whooping cough	15,545		101,539	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases All reports of yellow fever are published currently

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Ecuador—Loja Province.—During the month of September 1949, 2 cases of plague were reported in Guachanama, Paltas County, Loja Province, Ecuador.

Netherlands Indies—Java—Jogjakarta.—During the week ended October 1, 1949, 41 fatal cases of plague were reported in Jogjakarta Residency, Java, and 7 cases, all fatal, were reported in the city of Jogjakarta during the week ended October 15, 1949.

Siam (Thailand).—For the week ended October 15, 1949, 6 cases of plague, with 4 deaths, were reported in Siam.

Smallpox

French West Africa—Niger Territory.—Smallpox has been reported in Niger territory, French West Africa, as follows: July 1–31, 1949, 48 cases, 3 deaths; August 1–31, 134 cases, 5 deaths.

Mexico.—During the week ended September 24, 1949, 22 cases of smallpox were reported in Encino, Michoacan State, Mexico, and during the period October 2–15, 10 cases were reported in the Federal District of Mexico.

Nigeria—Lagos.—Smallpox has been reported in Lagos, Nigeria. as follows: September 1–30, 1949, 79 cases, 21 deaths; week ended October 8, 28 cases, 1 death; week ended October 15, 11 cases, 3 deaths; week ended October 22, 18 cases, 3 deaths.

Peru.—During the month of July 1949, 584 cases of smallpox were reported in Peru, including 333 cases in Cajamarca Department and 126 cases in Cuzco Department.

Typhus Fever

Peru.—During the period July 1–31, 1949, 140 cases of typhus fever were reported in Peru.

Puerto Rico—San Juan.—During the period October 8–21, 1949, 4 cases of murine typhus fever were reported in San Juan, Puerto Rico.

Yellow Fever

Gold Coast—Oda Area.—Yellow fever has been reported in Oda Area, Gold Coast, as follows: On September 28, 1949, 1 suspected case in Esuboni; on October 7, 1 suspected in Bawdua.

DEATHS DURING WEEK ENDED OCT. 29, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Oct. 29, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,068	9,152
Median for 3 prior years	8,928	
Total deaths, first 43 weeks of year	393,581	395,095
Deaths under 1 year of age	625	635
Median for 3 prior years	692	
Deaths under 1 year of age, first 43 weeks of year	28,120	28,701
Data from industrial insurance companies:		
Policies in force	70,083,885	70,838,920
Number of death claims	13,782	12,484
Death claims for 1,000 policies in force, annual rate	10.3	9.2
Death claims per 1,000 policies, first 43 weeks of year, annual rate	9.2	9.3

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year

Public Health Reports

VOLUME 64 NOVEMBER 25, 1949 NUMBER 47

IN THIS ISSUE

Better Patient Care Through Coordination

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
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CONTENTS

	Page
Better patient care through coordination. J. R. McGibony and Louis Block	1499
The concept	1499
The present situation	1503
Existing plans	1507
The region	1507
The regional council	1509
The program	1512
Clinical services	1512
Administrative services	1517
Educational services	1520
The budget	1526
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended November 5, 1949	1528
Foreign reports:	
Canada—Provinces—Notifiable diseases—Weeks ended October 15 and 22, 1949	1531
World distribution of cholera, plague, smallpox, typhus fever, and yellow fever—	
Cholera	1532
Plague	1532
Smallpox	1533
Typhus fever	1535
Yellow fever	1536
Deaths during week ended November 5, 1949	1537

Public Health Reports

Vol. 64 • NOVEMBER 25, 1949 • *No. 47*

Better Patient Care Through Coordination

By J. R. McGibony, M. D., and Louis Block, Dr. P. H.*

The Concept

Exchange of knowledge pertaining to hospital services and practices will further promote the contribution of the hospital to better patient care. This is accomplished by providing improved and more efficient clinical services, educational opportunities, and administration.

Although many hospitals in this country operate efficiently and provide a high standard of patient care, there is little doubt that there is room for improvement. In a number of hospitals, standards of care are too low and must be improved. Relative isolation of professional personnel in the less urban areas can and should be remedied.

Opportunity for the physician to continue professional studies after completion of school, internship, and residency must be provided. Periodical visits by professionally qualified personnel should be arranged, during which ward rounds, clinical conferences, and consultations can be held with discussions on timely clinical subjects of practical interest to the busy practitioner.

Education facilities for technical personnel should be provided to insure an adequate supply of such trained personnel for replacements and for stand-by duty to relieve those in the outlying hospitals, thereby giving the latter an opportunity to seek refresher training. Laboratories and ancillary services should be encouraged by financial support, advisory visits, and checking of methods and results by qualified consultants.

The same type of consultation and guidance in administrative matters, including costs, accounting, purchasing, personnel, and other phases of hospital administration, would promote the efficient utilization of personnel and expenditures.

Such promotion of efficiency can be accomplished through cooperation of participating hospitals within a region. Costs for hospital

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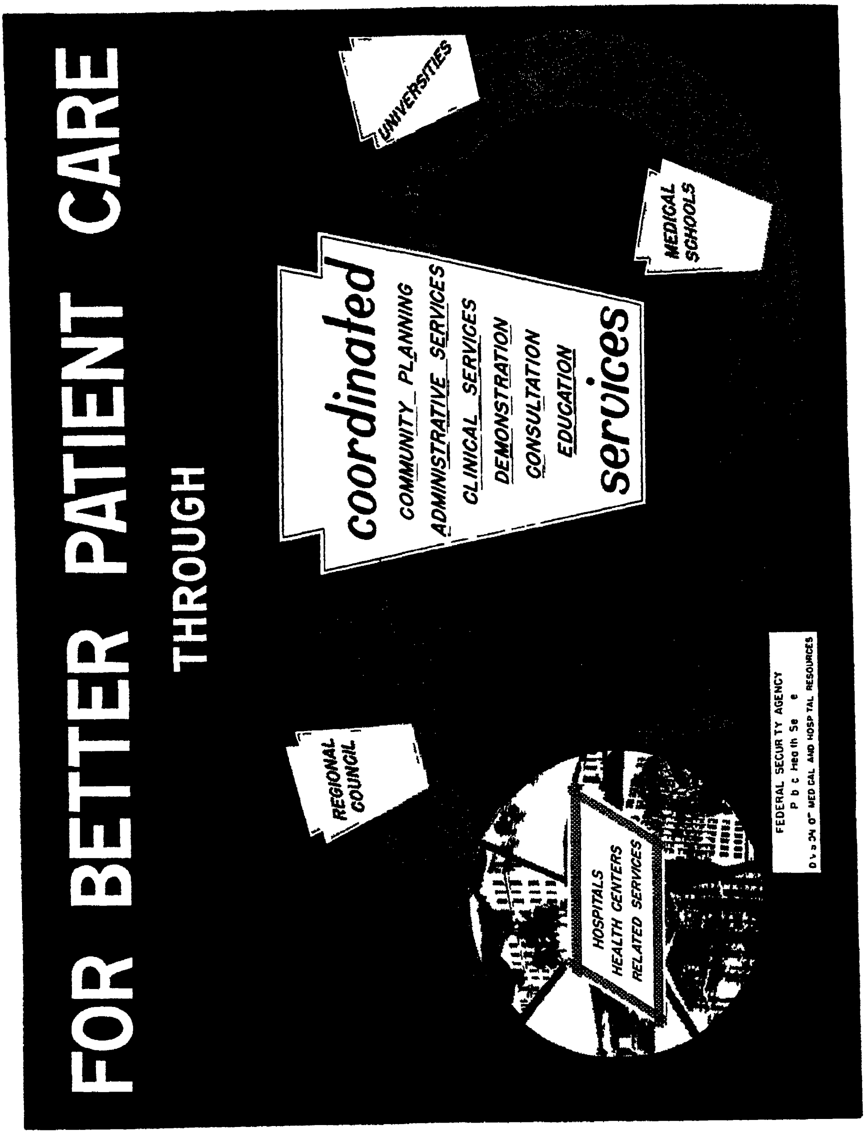
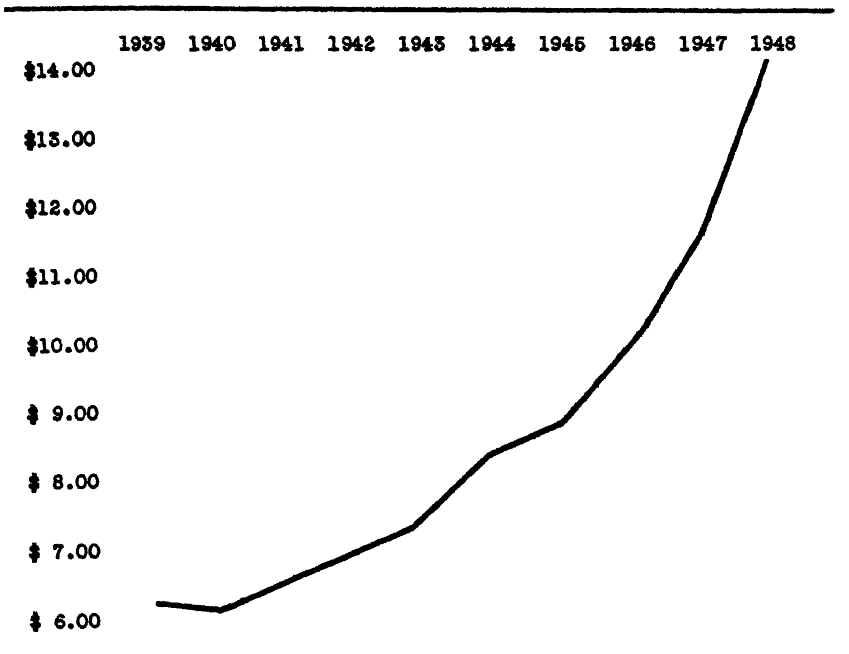
*Chief, and Program Coordinator, respectively, Division of Medical and Hospital Resources, Bureau of Medical Services, Public Health Service.


FOR BETTER PATIENT CARE
THROUGH
coordinated
COMMUNITY PLANNING
ADMINISTRATIVE SERVICES
CLINICAL SERVICES
DEMONSTRATION
CONSULTATION
EDUCATION
services
UNIVERSITIES
MEDICAL SCHOOLS
REGIONAL COUNCIL
HOSPITALS
HEALTH CENTERS
RELATED SERVICES
FEDERAL SECURITY AGENCY

services have been increasing so rapidly within the past few years that it is becoming difficult for a large portion of the population to defray the expenses of hospitalization for even ordinary illnesses. Even with financial assistance to a large segment of the population through voluntary health insurance or any governmental contributions to hospital maintenance and operation, it is incumbent upon hospitals to put their own house in order. It is only by this that the patients can be given the best possible care and a reasonable return for the expenditures of private or public monies.



Average Operating Cost per Patient Day in Voluntary Nonprofit Hospitals 1939–1948

Year	*Patient Day Costs*
1939	[1] $6.42
1940	[1] 6.39
1941	[1] 6.69
1942	[1] 7.14
1943	[1] 7.67
1944	[1] 8.50
1945	[2] 8.95
1946	[2] 10.04
1947	[2] 11.78
1948	[2] 14.05

[1] SOURCE—Hospital Management (Reports from 20,000 hospital beds).
[2] SOURCE—American Hospital Association Directory, 1946, 1947, 1948, and 1949.

The Bingham Associates Fund of Boston, in reporting its activities in this field, states:

"The establishment of hospitals in rural communities is of unquestionable value, for, among other things, such units may offer the physical requirements for the utilization of the more modern methods of medicine. However, an expensive surgical unit does not insure good surgery; complete X-ray apparatus does not predicate accurate X-ray diagnosis; and a well-equipped laboratory does not guarantee scientific aid in medical management. In fact, such facilities may do more harm than good if not intelligently employed. It is only human to be lulled into a false sense of security by trusting blindly to the wisdom represented by awesome and expensive apparatus. It is natural to want to shift responsibility, and what better object can be found to which to shift it than some inanimate, unresponsive, shiny machine which is reputed to give us such and such reliable information? It is also human to have great confidence in impressive things about which we know little or nothing. A surgeon may actually be misled into a false belief in his sufficiency by the impressive display of all the modern equipment which he employs. A physician may wrongly give assurance concerning a patient's heart because "the electrocardiogram was normal," and a patient may be permitted to suffer untold mental anguish because X-rays were inaccurately interpreted as showing cancer. No medical weapons are deadlier than those of the pseudoscientist."

It is plain, then, that upon those who make modern facilities available to rural communities a great responsibility rests in assuring the proper, continued use of these facilities. It is in this latter respect that present programs for the advancement of rural medicine have not been entirely successful. If properly utilized, a community hospital can be the most effective unit in a program for the advancement of rural medicine, for it is ultimately the community hospital which will determine whether good or poor medicine is to be practiced in the community.

Dr. William T. Sanger, President of the Medical College of Virginia, states, "When States, under the stimulus and the resources to be supplied by the Hill-Burton Act, develop hospital systems coordinated and integrated with the larger centers serving the smaller centers, including every possible educational resource, then we may expect a new day in medicine."

Medical care available at the crossroads and in the smaller community has decreased and as more and more physicians are concentrated in larger cities, the quality of service which the outlying communities can offer to their people has diminished. The plan of cooperation proposed here will go far to stimulate and encourage means of

combatting and reversing these tendencies. Through regionalization, it is hoped that the medical school and the teaching center can, in effect, grow out horizontally so that the campus of the medical school is extended to the entire region or to an entire State.

This is the concept of coordination or integration of hospital services.

Such cooperation can be achieved without loss to the hospital of its individuality, initiative, and local responsibility. Rather, the method acts as a stimulus to enlarged responsibility, to improved patient care, towards retention of competent professional personnel in less populous areas, and to more efficient expenditure of private and public funds. The experience in already established programs proves beyond question that benefits in improved medical and hospital care are tremendous in relation to the costs involved. It is imperative that leaders in the hospital and health fields give serious consideration to every method which will improve standards of patient care.

However, it must be remembered, as has been stated by C. Rufus Rorem, executive secretary of the Hospital Council of Philadelphia, that coordination is a point of view as well as an administrative structure. The inherent advantages can be entirely negated by lack of knowledge, vision, interest, and the egoism of self-sufficiency.

The Present Situation

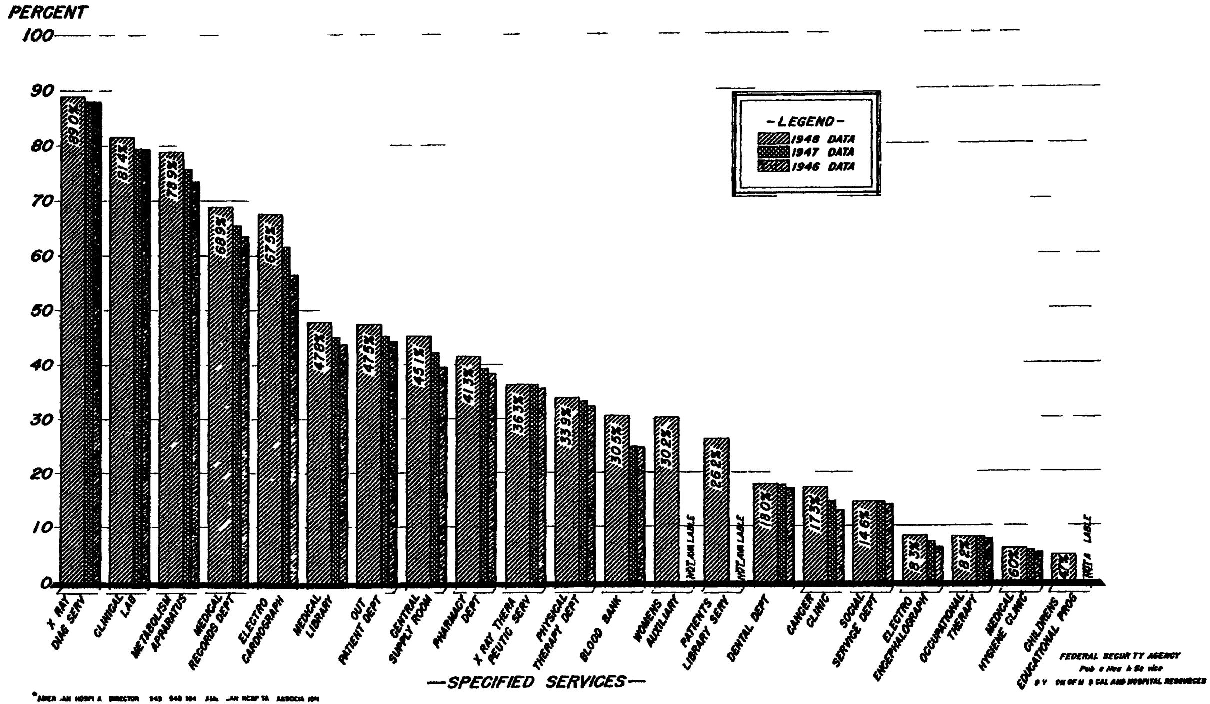
The Report of the Commission on Hospital Care [1] refers to our "system of hospitals" in these terms: "We frequently refer to our splendid system of hospitals, whereas actually there is none. Governmental units, church bodies, philanthropists, industries, and individuals have participated in the construction of hospital facilities. The diversity of background and objectives of the sponsoring interests has resulted in widely disparate patterns of organization, administration, and control of hospitals. There is very little coordination. In some instances, there even may be competition. Because of the rapid development and the nature of hospital service and the independence of the sponsoring agencies, we find disorganized, unrelated, and oftentimes overlapping patterns of hospital care. Critics describe them as uneconomic and ineffective. Patrons admit there is room for improvement."

America's hospitals have developed as independent units; each is a "rugged individualist." They largely stand alone in the provision of service. Each provides such services as it can give through its own resources and staff. Through the medium of association meetings there is some communication of new ideas, knowledge, and techniques from one hospital to another. The average hospital administrator is thus enabled to have limited contact with the leaders in the field and to

[1] Commonwealth Fund, New York, 1947.

PERCENT OF ALL GENERAL AND SPECIAL SHORT-TERM HOSPITALS PROVIDING SPECIFIED SERVICES

(EXCLUDING FEDERAL HOSPITALS)



take advantage of their ideas and experience. To a very large degree these are the sole means that now exist for the coordination of hospitals and hospital personnel and to effect the wide and rapid dissemination and application of new discoveries in the art and science of providing good patient care.

An analogous situation exists among the physicians. The student goes to medical school; he receives intensive training; and then in many cases he settles in some small community and loses touch with the medical school. By the end of five years, unless he keeps up through intensive reading or through postgraduate study, what he learned at medical school has become outdated and he is no longer well trained. There is no organized device for the rapid dissemination of new knowledge and techniques to the average practicing physician. Just as the average community hospital works alone as a single and isolated unit, so, in a sense, the physicians of the average small community provide their services with such resources as exist within the community and there is no means by which the superior resources of the medical center can be systematically brought to their aid.

A big problem which confronts all of us is how to raise the quality of service provided by the average hospital, particularly the small hospital, and its medical staff. The vast majority of our hospitals are small. Of the 4,499 non-Federal general hospitals in the United States which are reported in the 1949 Directory of the American Hospital Association, 1,980 have less than 50 beds, and another 1,064 have from 50 to 99 beds. Thus 68 percent of all of our general hospitals have less than 100 beds. All told, these hospitals have 125,416 beds or 27 percent of the total 471,555 beds in all non-Federal general hospitals. Under the Federal-State construction program we are helping to build mainly small hospitals. Twenty percent of all of the new general hospitals for which applications for Federal aid have been approved as of April 1949 will have less than 25 beds, and 70 percent of all of these general hospitals will have less than 50 beds. The average number of beds per general hospital project is approximately 49.

It is obvious that small hospitals are needed and that the public wants more of them, but it is also obvious that small hospitals by themselves—in the very nature of things—are not able to provide a complete service to the patient and that unless in some way these small hospitals are tied in with larger hospitals they may provide not service but a disservice to their patients.

Among all hospitals of 250 beds or over, 97. 8 percent have X-ray diagnostic service. Among all hospitals of less than 50 beds only 78. 7 percent have such a service. Of hospitals of 250 beds or over, 98. 5 percent have a clinical laboratory; only 63 percent of hospitals

with less than 50 beds have such service. Of all hospitals of 250 beds or more, 95 percent and 94 percent, respectively, have metabolism apparatus and an electrocardiograph, but only 59 percent of hospitals of less than 50 beds have metabolism apparatus and only 40 percent have electrocardiograph machines. Eighty-three percent of all large hospitals have a blood bank, but only 6 percent of all hospitals of less than 50 beds have one.

Under present conditions, it is obvious that the average small hospital, without excessive cost, cannot hope to provide many of the services needed by the people who live near it. One way these people can get the services they need is by going to the big city hospitals, to the medical centers. This has many obvious disadvantages from the standpoint of cost to the patient and convenience. It has another disadvantage—the small hospital and its staff becomes still less capable of handling the more complex and difficult cases. This procedure, in effect, drains the periphery of patients and tends to concentrate them in the metropolitan centers.

This has been going on in this country over the last few decades. There has been a withdrawal of physicians from rural areas and a greater concentration of our medical resources in the larger cities. This process of evolution should be reversed. What we should aim to do is to build up this periphery, to make small and moderate-sized hospitals more capable than they are at present of meeting the needs of their patients. This requires coordination among hospitals; it requires the development of relationships among hospitals whereby the larger and more amply staffed and equipped hospitals will provide smaller hospitals with the knowledge, skills, and services which the latter, by themselves, are unable to provide.

Under the present Hill-Burton hospital program, the States submit a State plan which consists in part of an inventory and appraisal of existing facilities, a determination of the need for additional facilities, and a program for construction of these facilities. In the development of its program each State has divided itself into hospital service areas which in turn are grouped into what are called "hospital service regions." As part of their plan, the States have submitted maps showing the envisioned coordination among the facilities of each region; that is, lines of affiliation between the base hospital or hospitals and intermediate or rural hospitals and between these latter hospitals and the small community clinics serving sparsely settled rural areas. However, in all except a very few places this regional coordination exists only on paper. Demonstrations, experiments, and research are needed to encourage the development of regional coordination and gradually breathe life into the paper maps.

Existing Plans

A number of programs of limited regionalization have come into existence. Generally these have developed through the aid of funds granted by a few philanthropic foundations. For example, there exists in the Rochester, New York, region the Council of Rochester Regional Hospitals, which is aided by an annual grant of $75,000 from the Commonwealth Fund and which envisions a program of regional coordination among hospitals of the region. In New England, there has developed a program of regionalization, aided by the Bingham Associates Fund, which provides for the coordination between the medical center in Boston and two intermediate hospitals in Maine and the provision of various services from these latter hospitals to community hospitals in the same State. A third regional center has been instituted in western Massachusetts which differs from those in Maine in that it is composed of a group of four hospitals of approximately 125 beds each. These four hospitals together carry on the activities of a true regional center. In Virginia a program of regional coordination has been developed by the Medical College of Virginia with the aid of the Commonwealth Fund. The University of Virginia Medical School is now joining this program so that the two medical schools, in effect, will serve the State between them. In the Carolinas, The Duke Endowment has developed a program of assistance to hospitals which includes standard architectural plans of variable sizes; a uniform system of accounting, thus contributing to better business management of hospitals; standard patient records, including comparative mortality rates; bylaws for boards and staffs of hospitals, which tend to restrict the more hazardous practices to surgeons and specialists who meet approved qualifications; and an extensive consultative and advisory service. In Michigan a program of regional coordination has developed with the aid of the Kellogg Foundation; in Cleveland, Ohio, the Cleveland Hospital Council has developed an extensive program of joint purchasing for hospitals and in other areas generally related to financial affairs. The nucleus for coordinated activities exists today in many localities.

The Region

State plans developed in connection with the Hill-Burton hospital program have established a pattern on paper for regionalization. In the plans each region is comprised of a group of two or more general hospital service areas which can be closely related to provide better hospital care through cooperative effort. These general hospital service areas currently contain or will contain one or more hospitals; the boundaries of the areas are drawn to include the population which tends in the main to seek service from the hospital or hospitals located in the area. In general, a hospital service area tends to be analogous

to the trading area of the town in which the hospital is located, and the dividing line between areas would, in theory, be drawn through those points where the population ceases to use the area hospital and begins to seek service from the hospitals in adjacent areas. An area may at present be without hospital facilities indicating that the people of the area now seek service from one or more hospitals located too distant from them, and that there is a need for a hospital to serve the area in question.

The States are required to distinguish three types of general hospital service areas—base, intermediate, and rural—in accordance with the role each area would play in a regional coordinated hospital system.

Base Areas. A base area must have the following characteristics: (1) Irrespective of the population of the area, it must contain a teaching hospital of a medical school which must be suitable for use as a base hospital in a coordinated hospital system; or (2) the area must have a total population of at least 100,000 and contain, currently or on completion of the hospital construction program, at least one general hospital with at least 200 beds. This hospital must furnish internships and residencies in two or more specialties and must be suitable for use as a base hospital in a coordinated hospital system within the State.

Experience gained in systems now operating indicates that in an urban center all large hospitals together should be considered as the base hospital. This becomes especially desirable if there is no medical school in the urban center. Member hospitals will naturally contribute in accordance with their interest and resources.

The Bingham report states that the clinical base hospital should not take over the work of the affiliated communities—this would be difficult and psychologically undesirable—but should serve as a clearing house for problems the latter may wish to refer. The base hospital, then, serves as a complement to and not a substitute for the affiliated hospitals.

Intermediate Areas. Such areas must have a population of at least 25,000 and contain, currently or on completion of the program, at least one general hospital which has a complement of 100 or more beds and which would be suitable for use as a district hospital in a coordinated hospital system within the State.

Rural Areas. For the purposes of the State plan this term designates other general hospital service areas, i. e., other than base or intermediate areas.

The delineation of hospital service areas should take into account not merely population distribution, distances, travel and trade patterns, and hospital utilization practices, but also such considerations as the sources of funds for construction and maintenance.

The Regional Council

Coordination among hospitals and planning future development of a region can be more complete if a competent regional council is formed. Membership in the council may vary according to the needs of the area. In the Rochester Plan full membership is limited to community hospitals, hospitals owned and operated by nonprofit associations and providing general care for acute illness. Associate membership is granted to governmental and proprietary hospitals. Tennessee expects to include all general hospitals and specialized hospitals with the exception of nursing homes.

Such a council would be organized as a nonprofit association and governed by a board of representatives of the various participating hospitals, physicians, and civic-minded lay persons. In any event the membership of the board should be of a caliber to permit sound planning of a total hospital program. Annual, semiannual, or more frequent meetings of the council are indicated. The regional council should have definite active coordinating relationships with State and national organizations such as the American Hospital Association, the American Medical Association, the American College of Surgeons, and similar groups.

The accompanying organization chart is presented as a pattern which may be modified or varied to meet the needs of the area to be served by the regional council. A brief description of the organization and activities follows.

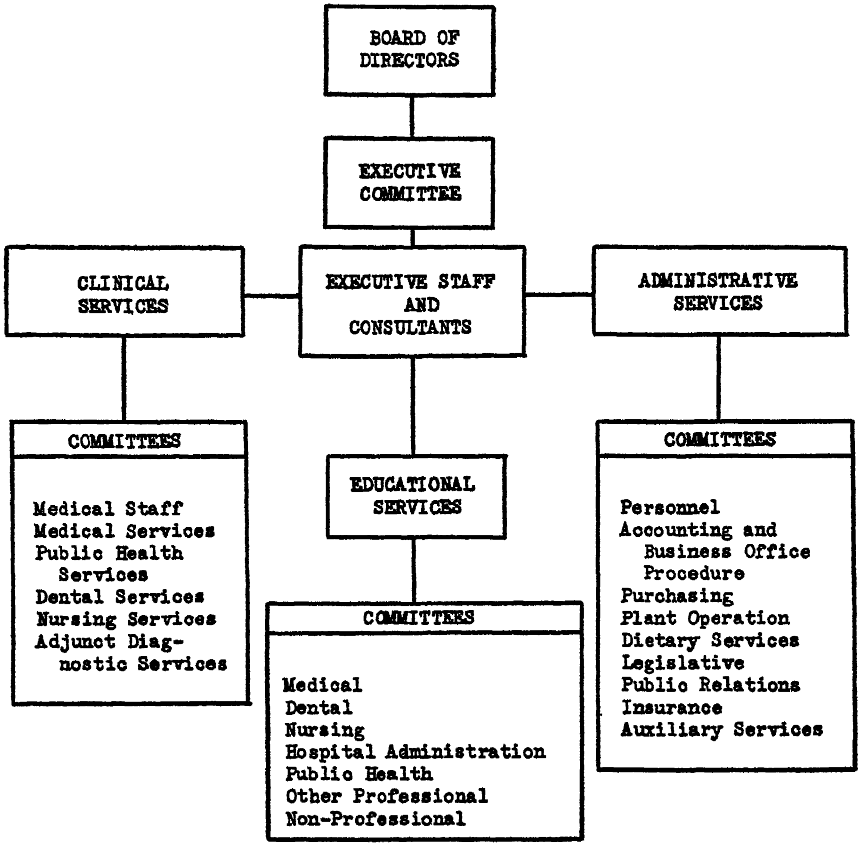
Board of Directors

The board of directors may be composed of one regular and one alternate representative from the governing boards of each member hospital, one delegate from each associate member hospital, one public representative from each county or area within the region, one representative each from the State Hospital Agency and the State Department of Health. This board guides the affairs of the council and sets its policies. In regions where there are a large number of hospitals represented, the board may become unwieldy in terms of numbers. In such situations the responsibility for planning and policy determination may be delegated to an executive committee of the board. A full-time executive director or secretary is needed.

Executive Committee

The executive committee is appointed from the board of directors. Its membership should be composed of leaders in the various fields to be represented. The number of persons to serve on the committee should be determined by the board of directors. The executive secretary of the council should serve as an ex-officio member of the committee.

REGIONAL COUNCIL ORGANIZATION CHART



Executive Staff and Consultants

The council and its executive committee will require a staff of full-time and part-time workers to carry out the various programs.

The executive director mentioned above is the key individual and should be selected with great care on the basis of administrative ability, vision, familiarity with the hospital and medical care fields, and all the other attributes one seeks in the successful hospital administrator. The relationship of the executive secretary to the board of directors should be practically identical with that of a hospital administrator to his governing board. He should participate in policy decisions and be given full responsibility and authority for direction of the executive staff and consultants in the execution of the various programs decided upon. The composition of the executive staff is presented below.

Staffing

During the early stages of the development of a regional hospital council it probably will be impossible, and perhaps undesirable, to recruit all members of the executive staff as listed. The program might best begin slowly, established upon a firm basis, to insure full understanding and cooperation of participating groups; this latter is necessary for success.

Some portions of the program may not require full-time staff personnel. Assistance may be obtained from agencies such as the State Hospital Association, the State Hospital Agency, the State Department of Health, local governmental and nonprofit agencies, universities, and associations. In fact, one of the primary responsibilities of the executive director and his staff should be the coordination and utilization of existing resource material and personnel.

The following staffing suggestions will vary with the needs of the area and with the extent of the program undertaken. It will also be affected by the stage of development of the program and the speed with which it is to be accomplished. For this reason, these suggestions merely indicate the categories of individuals that will be needed. Numbers of such individuals and assistants in any particular category will depend upon the magnitude of the program and other factors mentioned.

STAFF

Executive Director.
Business Manager.
Nursing Director.
Statistician.
Clerical Staff.

Consultants—full or part-time

1. Medical Education.
2. Medical Services.
3. Nursing Education.
4. Nursing Services.
5. Hospital Administration.
6. Accounting.
7. Purchasing.
8. Pharmacy.
9. Dietetics.
10. Medical Records.
11. Public Health Engineering.
12. Health Education.
13. Health Economics.
14. Medical Social Service.
15. Public Relations.

Committees

The board of directors will need to appoint committees in the three phases of interest and special needs for proper coordination. These are (*a*) clinical services; (*b*) administrative services; and (*c*) educational services. Their purpose is to serve as a forum for the exchange of information relating to three broad fields and to initiate activities to be carried out with and by the executive staff.

It may be desirable for the committees to have advisory groups from any source within and without the council which can assist in program

development. In addition to council members, local, State, and national organizations, agencies, and associations should be asked to participate. They may be colleges, governmental or nongovernmental, professional and nonprofessional. It should be noted that although certain committees may be shown on the organization chart under a particular group, the subject matter with which the committee is concerned will be related to and have implications for the programs charted by the other advisory groups as well. For example, although dietary service is listed under administrative services, it also has both clinical and educational implications. In those instances where such relationships do exist, representatives from the pertinent advisory groups should be included on the committees. The advisory relationships of these groups to the board of directors should be through the executive director and the executive committee if such a committee exists.

The Program

Examples of studies and services that might be undertaken in whole or in part by the council and its committees in the fields of clinical services, administration, and education include:

CLINICAL SERVICES

The development of that phase of the council's program dealing with clinical services is a responsibility not only of the council itself but of the medical association as well. Such a program should be worked out jointly and should have both representation and participation of all groups interested and affected. Care should be exercised in assuring that both administrative and educational interests are also considered in the development of any project or phase of the clinical program.

General Diagnostic Facilities and Services

Diagnostic facilities of the large and specialized hospitals can be made available to participating hospitals. Certain beds may be established for diagnosis with the patients remaining for the minimum period of time necessary for complete diagnostic report. Patients are returned to their own physicians. Complete reports of findings, recommended treatment, and literature on the subject are sent to the referring physicians. In addition to the more uncommon, obscure, and difficult conditions, cancer and psychiatric disorders are among those for which the larger center may be better staffed and prepared to handle.

Clinical Consultation

Pathology. The small hospital usually will not be able to have a full-time pathologist. The services of a competent specialist in this field might be made available to satellite institutions from the larger center through referral of specimens, or better, through periodic visits of the specialist. A combination of the two practices might evolve. Increase in tissue and post-mortem examinations will promote the general quality of medical care in the region.

Laboratory Services. The services of a competent specialist in this field and the coordinated use of laboratory facilities makes possible better diagnosis, better trained personnel, and economy through centralization of the more expensive equipment. The specialist can assist participating hospitals in standardizing procedures, records, and techniques. The report of the Bingham Associates Fund states that in an attempt to standardize laboratory procedures, many of the hospital laboratories receive from the central laboratories solutions of the various reagents used in tests. By means of this arrangement the number of variable factors is reduced, and accurate results are more easily obtained in the small community hospitals.

Radiology. The same problems and possible solutions apply in radiological diagnosis and therapy as in the field of pathology. All hospitals need some type of X-ray equipment, but it is necessary to have expert film interpretation and, on occasion, therapy which is too expensive for each hospital to furnish.

Cardiology. Like the above, cardiologists may be made available to interpret and report on electrocardiograms for participating hospitals and to serve several hospitals on request or on regularly scheduled visits.

Premature Infants. The average hospital very seldom has more than one or two such infants at any one time, yet in most instances it attempts to maintain a readiness to serve in this capacity. However, prematurity is a condition which requires special facilities and specially trained personnel for best results. Such results can be obtained by centralizing resources under competent, scientific supervision. The Children's Bureau can give competent assistance in the development of such a program.

General. Detailed exploration of possibilities in all clinical fields, medicine, surgery, obstetrics, dermatology, pediatrics, orthopedics, tuberculosis, cancer, psychiatry, and the other specialties would make this outline entirely unwieldy. It suffices to say that the intelligent council will not be at a loss in establishing fields of need.

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Pharmaceutical Services

Pharmaceutical services constitute about 5 percent of the total cost for hospitalization. Through coordination it may be possible to reduce this amount or obtain better services for funds expended. Less than 40 percent of all general hospitals have full-time pharmacist services. The problem looms much larger in the hospital of less than 100 beds, which usually is not in position to afford a full-time pharmacist.

Cooperative effort on a regional basis can help these small hospitals establish part-time supervision by qualified local pharmacists, or permit joint employment of a full-time pharmacist to serve several institutions.

Consultation and guidance can be given to member hospitals in a number of ways, including:

(*a*) Formation of an active pharmacy committee.
(*b*) Development of a simplified formulary.
(*c*) Guidance on purchase, storage, inventory, and control of drugs.
(*d*) Simplification of standardized forms and records.
(*e*) Proper narcotics and barbiturates control.
(*f*) Manufacturing.
(*g*) Professional and administrative audit of pharmaceutical activities.
(*h*) Space, equipment, and staffing requirements.
(*i*) Conferences and educational activities pertaining to pharmacists and pharmaceutical services.

Nursing Activities

Nursing personnel comprises by far the larger portion of hospital personnel. Regional studies are needed on patient nursing services and demonstrations of methods and types of personnel required to meet these needs. Research studies, consultation, and demonstrations should be focused on nursing department administration, and on problems relating to operating room, delivery room, records, central supply, hospital design, equipment, and other factors as they affect efficient nursing functions.

Public Health

The division between preventive and curative medicine no longer exists as a practical factor. Hospital and public health leaders must accept the challenge of fusing all such related activities so that community resources will be utilized to the best advantage to community health and general welfare. This means joint planning of hospital and public health programs; use, where possible, of joint housing,

personnel, equipment, administration; joint operation of common departments such as clinics and out-patient services, records, follow-up, and health education.

A joint statement of the American Hospital Association and the American Public Health Association [2] recommended coordination of hospitals and health departments, and stated:

"Hospitals and health departments have a common interest in providing the best possible technical facilities and administrative tools for the further development of both the preventive and therapeutic aspects of medical practice.

"There are many ways in which health department and hospital personnel can work together effectively. In urban areas, for example, cooperative arrangements between hospital social workers and public health nurses can prevent duplication of services and increase efficiency. In rural hospitals and health departments, although medical social workers are not generally employed by the separate institutions, it should be possible to employ a medical social worker to serve both agencies where there is combined housing of the health department and hospital.

"In urban as well as rural areas the public health nurse can provide continuity of care for discharged hospital patients by carrying out the treatments recommended by the physician and giving home nursing care and supervision. This is true not only for patients with communicable disease but for all hospital patients, whether ambulatory or not, who require further home supervision or care. Physicians, hospitals, and health departments should together agree on and carry out simple and effective referral systems.

"There are several ways in which the medical staff of the hospital can contribute to the activities of the health department. Arrangements may be made for members of the visiting staff to conduct specific health department clinics on a part-time salary basis. Members of the visiting and resident staffs can instruct public health nurses in current medical advances and assist in the health department's educational program by lecturing to community groups. Such service by physicians contributes to the building of a close partnership of physician, hospital, and health department to meet the over-all health needs of the locality.

"It has long been recognized that pyschiatry suffers through its isolation from general medicine. Similarly the average physician, having received little or no training in psychiatry, is handicapped in his ability to recognize, treat or prevent mental disease. The importance of mental illness is indicated by a recent estimate that approximately 1 patient out of every 28 new admissions to general hospitals, and 1 out

[2] Coordination of Hospitals and Health Departments. Am J. Pub Health 38 May 1948 American Public Health Association, 1790 Broadway, New York City.

of every 16 new admissions to out-patient departments presents problems requiring the services of the psychiatrist.

"Hospitals can provide an effective environment in which to educate the public in health matters. In addition, hospitals are repositories of much valuable information on the incidence of disease which should be studied and utilized in the development of control programs. They occupy an important position in relation to plans for controlling heart disease and cancer and are natural locations for cardiac and tumor diagnostic clinics. The recent development of cancer detection clinics, in which apparently well persons receive thorough diagnostic examinations, promises to encourage greater concentration on this type of preventive activity by the staffs of general hospitals."

Prevention of Communicable Disease

The above report continues:

"The control of tuberculosis, venereal disease and other communicable diseases affords numerous opportunities for joint action by hospitals and health departments. Tuberculosis and venereal disease clinics belong properly at the general hospital, not at the city hall or some other non-medical institution. Likewise, rapid treatment centers for syphilis should, insofar as possible, be housed in general hospitals rather than organized separately.

"With present knowledge of the control of cross-infection there is very little reason for establishing special hospitals for the care of acute communicable disease. With the possible exception of large urban centers, such special hospitals are economically wasteful and seldom provide services which meet the total needs of the patient. A more rational approach is to use general hospital beds for the care of patients with communicable disease and to obtain the assistance of the health department in developing effective isolation techniques. Such cooperative action will be facilitated if the hospital appoints the health officer to its medical staff as consultant in communicable diseases.

"Routine chest X-rays as well as serological tests for syphilis ought to be undertaken by all hospitals. The interest of the health department in these health-protection activities should take the form of substantial financial and technical aid. With such assistance every hospital can become a strategic center in the community attack on tuberculosis and venereal disease.

"Close working relationships between general hospitals and tuberculosis sanatoria are necessary to afford sanatoria patients the advantages of modern surgical therapy as well as consultation services. For similar reasons a portion of the newly established hospital beds for tuberculosis should be located in or closely connected with general hospitals."

ADMINISTRATIVE SERVICES

The development of this phase of the council's program is the responsibility of the State Hospital Association as well as the council itself. Planning for such a program and implementing it require cooperation. In addition, both the clinical and educational aspects should be considered in the development of any project within this phase of the program.

Administration

Under the guidance of a regional hospital council more efficient expenditure of community funds could be attained through stimulation and exchange of information on the development of improved administrative methods.

This would lead to better utilization of beds. The average general hospital bed is used by about 20 patients each year. It has been shown that by better administration the same bed might serve almost twice as many patients, thus reducing to some extent the need for new facilities within a community.

Direct administrative efficiency demonstrations might well include: (*a*) establishment of efficient and uniform accounting and cost accounting methods; (*b*) establishment of central purchasing of supplies and equipment (reports of such practices indicate savings of 5 to 25 percent); (*c*) insurance and joint fund raising efforts; (*d*) central employment guidance for better utilization of personnel, including uniformity of personnel policies and practices, salary scales, work hours and conditions, employee health and safety programs, training and refresher courses, retirement, and accomplishment stimuli. (In such a program the smaller hospitals can serve as recruiting posts for schools of nursing and for other courses operated only in larger institutions; larger hospitals would serve as reservoirs for personnel for the area.)

Hospital Finance

Analysis and correlation of the prevailing hospital financial structure with special emphasis on sources of hospital income are almost imperative for the region. Due to the uncertainty of the status of patient income and other sources of income, detailed studies of trends are necessary in order to accurately determine the necessity for additional support for hospital operation. Such a study of hospital financing must relate the hospital's operating expenses to the income received. Although little is known about the details of hospital operation and hospital costs, even less is known about the hospital's income except in a very general and broad sense. Factual studies of a region will eliminate a great deal of prevailing guess work and

argument when determining the total amount of support that hospital care may require from both private and public sources. Such an analysis can be made without reference to how this support should be administered, although guidance can be given by the hospital council.

A preface to any detailed studies of hospital finance is a uniform basic system of reporting both hospital expense and income. Such a basis is now being planned by various voluntary representative organizations of the profession and governmental agencies in the form of recommended accounting procedures for hospitals.

Central Purchasing Program

The Rochester Regional Council states that the outstanding features of the central purchasing program are these: Member hospitals have agreed on specifications and standards for certain items such as linens, and it is planned that a single order representing the needs of all participating hospitals for a 6- or 12-month period will be placed at one time. In this connection, it is hoped that inventory and budgetary practices in the small hospitals will be improved. The possibility that participating hospitals would agree to make *all* purchases of certain items through the program was discussed and rejected. Under the present system there is no compulsion to purchase through the council. Hospitals may make such purchases as they choose through the council and others wherever they like. The council acts simply as a central purchasing office, receiving orders from the members and turning them over to suppliers for shipment directly to the hospitals. The council does not warehouse. The council pays cash as bills come in, in turn billing the hospital receiving the goods.

To assist in developing the program, the council employed a consultant on purchasing. It also secured joint membership for its member hospitals in the Hospital Bureau of Standards and Supplies, a cooperative buying organization. Membership dues in the bureau were prorated to hospitals so that many smaller ones whose volume of purchases had been too small to enable them to take advantage of bureau membership became members at a nominal fee. Under the joint plan, dues for the larger hospitals which previously had held individual membership were also substantially reduced.

With the bureau furnishing a nucleus of suppliers, the council began its central purchasing program in November. Its object was to take advantage of cash discounts for members and to secure favorable prices through quantity transactions. Its ability to pay cash was predicated upon a revolving fund of approximately $6,000. The fund consists of a loan from each participating hospital equal to $2.50 per bed. At any time a hospital withdraws from the purchasing program, this sum will be returned to it.

It is believed that the central purchasing program will mean average savings of 20 percent to hospitals, relatively more to small than to large hospitals, although the latter can profit substantially.

Two difficulties have been encountered in this program. First, the tendency of many hospitals to purchase in very small orders, which means increased overhead. Attempts will be made to overcome this difficulty through explanation and education. The second is the poor cash position of some hospitals. Unable to take advantage of cash discounts offered by suppliers and forced to accept disadvantageous, long-term credit terms for items of immediate need, they are unable to honor council billings promptly, possibly endangering the program's revolving fund.

Personnel and Staffing Requirements

This type of study among hospitals within a region should include not only existing practices regarding the number of personnel of each type in relation to beds and patient load, but should be extended to determine for each particular type of illness and patient, the recommended and minimum requirements of both professional and non-professional personnel necessary for adequate and safe service to patients. Since wages and salaries represent approximately 60 percent of the hospital's expenses of operation, this area requires careful study for proper consultation to member hospitals. Saving in this area can prove beneficial to the patient in that (1) it reduces the cost of hospital care, or (2) at the same cost provides additional necessary service. An analysis of personnel needs, requirements, relationships, job specifications, job descriptions, classification, and utilization should be related to standard requirements developed from a study of patient needs.

Dietary Services

Next to personnel, dietary services form the major cost in hospital operation. In order to give assistance in proper design and efficient functioning of hospitals for good patient care, there is a great need for study and consultation on dietary policies such as: central tray and bulk food services; personnel requirements, training, qualifications, functions; space needs; refrigeration; equipment selection and care; food purchasing, storage, preparation and service; sanitary practices for food handlers; regular and special diets and menus from service and therapeutic standpoints; costs; administration; waste; and other related factors.

Plant Operation

Studies, demonstrations, and consultation in this field are of direct importance to design and construction of physical facilities and the licensure programs of the States. There is need for consultation on housekeeping procedures and techniques; fire hazards; safety programs for patients and employees; techniques of sterilization; use of germicidal lights or other methods for air disinfection; use of radioactive isotopes and disposal of radioactive materials; disposal and sterilization of linens, particularly in tuberculosis and communicable disease hospitals; insect and vermin control; laundry management, methods, techniques, equipment, supplies and utilization; operating room explosion hazards.

Equipment and Supplies

To carry out a truly coordinated program effectively and to promote efficient hospital management, consultation should be available relating to standardization, purchase, specifications, and utilization of specialized hospital equipment. Increased standardization and simplification of various types of hospital equipment could result in large savings to hospitals. Assistance relating to property records, perpetual inventory, and the storage, depreciation, and replacement of equipment is also needed.

Building Design and Construction

In view of the high construction costs of hospitals and related facilities, there is need for guidance on more compact and efficient design and construction, and the possible utilization of less expensive building materials. Information is also needed in the fields of hospital lighting, heating, ventilation, air-conditioning, communication systems, and fire safety.

EDUCATIONAL SERVICES

The educational phase of the council's program is the responsibility of all groups concerned, clinical as well as administrative. Educational projects will, of necessity, be closely related to the other phases of the program.

Assignment of Interns or Residents on a Rotating Basis to Community Hospitals

Under such an arrangement. although the number of interns is limited, a teaching hospital might assign interns on a rotating basis to participating smaller hospitals ordinarily not able to obtain interns but where adequate supervision is maintained. This arrangement benefits

the small hospital by giving it a resident physician. The teaching activities which should accompany proper training of the intern at the small hospital would benefit all the staff physicians and ought to improve standards of care. Since physicians frequently decide to set up practice in the community in which they have interned, the community as a whole might benefit from this program.

Arrangements of this type can work out to the benefit of all concerned. Thus, Dr. William T. Sanger, president of the Medical College of Virginia, writes:

"For years medical schools have been educating their graduates away from small community practice. The only hope of reversing this process is reaching out with a vital educational program to the small hospitals willing to cooperate, developing strong ties of friendly association, which lead to giving the small community hospital the best the larger medical center has to offer, breaking down isolation, which every professional person fears, and developing a oneness of interest and purpose both for the small and the larger center. Thus, everyone concerned profits, the patient most of all in the ultimate."

Dr. Brooks Ryder, administrator, Bingham Associates program, states:

"One interesting and worthwhile program that has been developed is that of having a teaching resident work in some of the affiliated hospitals. This teaching resident is usually a physician who has completed his basic training for his boards in internal medicine. He is assigned to the regional hospital with the basic purpose of developing and carrying out an organized training program for the house staff. As was expected, however, the benefits are not limited only to the interns and residents, but the visiting staff also attends many of the teaching activities. The duties of such a teaching resident include making rounds with the house staff, discussing methods of diagnosis and treatment, preparing and arranging clinical pathological conferences, death conferences, medical conferences, etc."

Clinical Conferences

The staff of each participating small hospital decides ahead of time the subject of the clinical conference. It might be, for example, "obstetrics," or "psychiatry in relation to general practice," or "the diagnosis and care of cardiac diseases." The regional council, through the medical school, sends a qualified consultant in the particular field to hold the conference at the member hospital. Such conferences are beneficial as training experiences for staff members. In addition, they frequently lead to the development of lasting relationships between the physicians of the locality and the particular consultant.

Continuation Courses

Medical knowledge is expanding so rapidly that the average practitioner soon falls behind unless he keeps up through intensive reading and study. Continuation courses are one means of refreshing and bringing up to date the medical practitioner's knowledge. Such courses should be held by a teaching hospital or medical school. They might last for two weeks, a week, or only two or three days. Each course would be devoted to a particular subject: for example, "treatment of fractures," "therapy of common diseases," "allergy conditions," etc.

Dr. Roy C. Crosly in a report on the Bingham Associates Fund and Tufts Medical School General Practitioners Training Program states:

"The provision of optimum training for medical graduates intending to go into general practice is one of the more difficult problems with which those interested in graduate medical education must contend. Ideally, since a large part of the general practitioner's work will be in the field of general medicine, a prolonged period of medical training is advisable. Since he will be called upon to perform major surgical procedures, at least those of emergency nature, he should be well trained in basic surgical principles and particularly trained to perform those surgical procedures which he may be called upon to perform. Fracture work will often fall to his lot if it is to be promptly and competently handled as it must be for good end results. The American Academy of Pediatrics has found that 75 percent of the medical care of children in this country is provided by general practitioners. The necessity for pediatric training is obvious. Similarly, the practice of better obstetrics necessitates the better training of general practitioners in this field since they provide the major part of obstetric care in this country. It therefore becomes obvious that ideally the general practitioner should have sufficient periods of time in his graduate training to acquire some skill at diagnostic and therapeutic medicine, surgery, orthopedics, obstetrics and pediatrics, which would obviously involve several years of training after medical school. . . .

"Consequently, in order to provide comprehensive training for men who intend to go into general practice, Tufts College Medical School and the Bingham Associates Program instituted a two-year training program for general practitioners in July 1948.

"The first year of this two-year training program is provided in the form of rotating one-year internship in hospitals affiliated with the New England Medical Center with provisions made locally for an attractive and well-rounded program under the direction of men qualified to provide such training. Since training in affiliated hospitals cannot be as comprehensive or as didactic as that in a medical

school teaching center, the second year of the two-year program is provided at the university teaching center and is planned in such a way that each of the men receives a maximum of individual instruction in diagnostic and therapeutic medicine, surgery and specialties, obstetrics, and pediatrics. The services of the men in training are used only insofar as they are directly necessary for their best training."

Such courses should not be confined to physicians. Dentists, nurses, and hospital administrators within the region would benefit by similar arrangements.

Training Leading to Specialization

A regional hospital council might aid in the postgraduate training of physicians from small communities.

The Bingham Associates Fund, in cooperation with the New England Medical Center and the Tufts College Medical School, has a program of postgraduate training designed to prepare graduates for the various specialties. This plan provides for four years of training, with each year offering increasing professional responsibility. The first year is spent as an intern in one of the hospitals affiliated with the New England Medical Center; appointments are made on a competitive basis in the second year which is spent at one of the hospitals approved for residency; the men whose work justified continuation in internal medicine are appointed for a third year as assistant residents at the Joseph H. Pratt Diagnostic Hospital, and during the fourth year opportunity is provided for experience in the medical specialties such as neurology, hematology, or psychiatry. A similar program is offered in surgery. In addition there are residencies offered in neurology and psychiatry, as well as residencies or fellowships in endocrinology, cardiology, pathology, and anesthesiology.

Medical Records

The Rochester Report states that the main source of statistics with which a measurement of the quality of hospital and medical care can be made is the medical record. Unfortunately, medical records kept in many hospitals are inadequate or are not used because of failure of physicians to complete medical records accurately, completely, and within a reasonable length of time; lack of medical record librarians trained to properly keep, classify, and index records and to develop useful statistics from them; and widely varying record systems and nomenclatures.

There are two ways in which the records might be made useful and valid: (1) standardization of systems and of nomenclatures, and (2) training of medical record librarians.

The Tennessee proposal for a coordinated hospital system sets forth the following:

Training of Medical Records Librarians

The improvement of hospital records is an important part of this program. Record systems need to be developed to aid in the entire program. Improvement of records requires an active medical records committee and also training of medical records librarians and clerks responsible for the records in participating hospitals.

(*a*) *Short Courses.* Short courses are to be arranged in one of the large hospitals in which a good record system is developed. Relief librarians may be employed so that clerks may attend the courses.

(*b*) *Fellowships.* For a few hospitals trained records librarians may be needed. (According to the American Medical Association courses are given in several hospitals and fellowships are available.) [3]

(*c*) *Consulting Services.* Consulting services are to be given to the participating hospitals by the medical records librarian on the staff.

Medical Library Facilities

Medical library facilities are to be made available for use by participating hospitals. The University of Tennessee is the ideal place for the development of this library service. Periodicals would be purchased for circulation and in answer to requests papers would be sent out to participating hospitals.

Nursing Education

Procurement and Education of Registered and Practical Nurses. This program is to assist in developing facilities as needed to serve the hospitals in the region. This may mean additional facilities and courses for registered and practical nurses.

Postgraduate Fellowships. Postgraduate fellowships for nurses for training, as in anesthesia, in care of premature infants, in supervision, in surgical nursing, and in other related fields.

Short Courses. Postgraduate short courses on special subjects such as surgical nursing, care of newborn.

Nursing Conferences. Nursing conferences are to be arranged for group discussions.

Consulting Services. The nurse on the regional council staff is to provide service to participating hospitals on a consulting basis.

Training of Administrators

Fellowships. Hospital administrators may be granted fellowships for training for service in some of the hospitals.

Short Courses or Conferences. Short courses and/or conferences may be advisable for hospital administrators.

Consulting Services. Consulting services in hospital administration may be given by a qualified hospital administrator or consultant.

[3] Journal American Medical Association. May 7, 1949.

Hospital Licensure

The aims and objectives of the State hospital licensure programs are essentially identical with those of the coordinated hospital system. Both programs are directed toward the objective of improved patient care. It would be reasonable to assume that in the establishment and conduct of a comprehensive hospital licensure program it might well include consideration of the coordinated hospital system. The basic structure set up by the various States for implementing the hospital licensure laws provides a concrete foundation which may be utilized to demonstrate the over-all benefits to be achieved through the coordinated system. Through their intimate contacts with the individual hospitals, the personnel of the State health department or other regulatory agency would be in an excellent position to point out the benefits to be derived. They would also be in a position to obtain the active support not only of the professional groups concerned with the over-all problem but also the interest of the general public through their connections from a purely public-health standpoint. For example, some of the public-health programs have a direct relationship to hospital service. There has been one instance where the hospital licensure standards of a State provide that the hospitals in the State shall give serious consideration to the development of a coordinated system. This is evidence that some States feel they have a responsibility in the development of the coordinated hospital system in the discharge of their legal responsibilities to insure the patient of safe, adequate care. This concept should be extended to other States. Whether it is desirable to include such a regulation in the licensing standards at this time may be debatable. Nonetheless, the cooperative relationships between the licensure agency, the State hospital association, the professional groups and others would provide a basic structure on which the promotion and development of coordinated hospital systems might well be developed.

Health Education

The health educator can serve as a member of the team in planning, in developing the coordinated hospital system in a State, in interpreting the elements of the cordinated system to professional and technical persons, and in obtaining the understanding and support of the public. To do this, however, there needs to be a body of scientific data upon which the educator can draw, as well as support from other professional persons.

The development of the coordinated hospital system points up the need for considering the use of a health educator as a member of the professional team which develops the plan.

Technician and Other Professional Training

The report of the Bingham Associates Fund states that technicians in each small hospital annually spend one month in Boston for the purpose of improving their techniques and learning new methods and procedures. An itinerant technician is provided to substitute in the affiliated hospital for the duration of the course. Some of the affiliated hospitals are so small (10 to 20 beds) that they do not seem to require a full-time laboratory technician. No hospital is too small to have nurses, however, and, therefore, arrangements have been made for hospitals in this category to send one of their graduate nurses to Boston for three months of instruction in the technique of performing certain simple but important laboratory tests. Through such a course, and annual one-month courses thereafter, it is possible for a graduate nurse to perform, on a part-time basis, common laboratory tests. Arrangements have been made for the more difficult tests to be done in the regional centers.

Similar programs can be developed for other professional personnel.

The Budget

Funds necessary for effectuating a program of coordination will vary, of course, with the extent of the program undertaken, the speed with which the program is to be put into operation, and with the needs of the area. For this reason, it is advisable to indicate only those general areas for which funds must be planned for the operation of the executive staff. Estimated amounts are not indicated because of the variations possible. The following items, in addition to staff salaries, must be considered in the determination of a specific budget: office equipment and supplies, printing, automobiles, gasoline, oil, services, rents, utilities, and travel expenses.

In addition to funds needed to operate the council and its executive staff, there will be a need for funds to carry out the projects and activities indicated under the various services: clinical, administrative, and education. It is not feasible to indicate anticipated expenses for such undertakings since they will be governed to a great extent by the cooperative relationships established with and among participating groups and organizations. It is conceivable that budgets may range from $25,000 to $250,000 depending upon such participation and the magnitude of the program undertaken.

It is probable that many activities, once they have become firmly established, could be made self-supporting, i. e., the participating hospitals could contribute to defray the cost of various services; the cost might be assumed as part of the regular budget of the medical school or the teaching hospital of the region, or the cost might be defrayed through grants obtained from foundations, associations, or

government (local, State, and Federal). Still another means of meeting some of the expenses may be participation of various organizations or groups through personnel utilization. Any one of these means or all of them may be required to finance a well-planned program of regional coordination.

In October 1949, the Eighty-first Congress enacted Public Law No. 380 which amended the basic law authorizing activities of the Public Health Service to include:

STUDIES AND DEMONSTRATIONS RELATING TO COORDINATED USE OF HOSPITAL FACILITIES

Sec. 636. In carrying out the purposes of section 301 with respect to hospital facilities, the Surgeon General is authorized to conduct research, experiments, and demonstrations relating to the effective development and utilization of hospital services, facilities, and resources, and, after consultation with the Federal Hospital Council, to make grants-in-aid to States, political subdivisions, universities, hospitals, and other public and private nonprofit institutions or organizations for projects for the conduct of research, experiments, or demonstrations relating to the development, utilization, and coordination of hospital services, facilities, and resources. Any award made under this section for such project in any fiscal year may include amounts for not to exceed the four succeeding fiscal years, and such amounts for such succeeding fiscal years shall constitute contractual obligations of the Federal Government.

The Division of Medical and Hospital Resources has been given the responsibility for administering this program. Many of the activities suggested in the foregoing outline can be assisted in their establishment through the provision of grants for research, consultation, and demonstration.

Full utilization and practical application of these concepts, philosophies, and programs of coordination will make possible the attainment of the goal—BETTER PATIENT CARE.

ACKNOWLEDGMENT

Appreciation is expressed for review and valuable comments and suggestions by the following individuals, other than those of the staff of the Public Health Service, from whom direct and indirect quotations and thoughts are freely utilized:

A. C. Bachmeyer, M. D., Director, Chicago University Clinics; George Bugbee, Executive Director, American Hospital Association; Graham Davis, Director, W. K. Kellogg Foundation; John A. Ferrell, M. D., Executive Secretary, North Carolina Medical Care Commission; R. O. D. Hopkins, Executive Director, United Hospital Fund of New York.

R. H. Hutcheson, M. D., Commissioner, Tennessee Department of Public Health; Robert Jordan, Division of Rural Hospitals, Commonwealth Fund; Albert D. Kaiser, M. D., Executive Director, Council of Rochester Regional Hospitals; Samuel Proger, M. D., Bingham Associates; W. S. Rankin, M. D., Director, Hospital and Orphan Section, The Duke Endowment.

John E. Ransom, Director, Hospital Division, Georgia State Department of Health; C. Rufus Rorem, Executive Secretary, Hospital Council of Philadelphia; Brooks Ryder, M. D., Administrator, Bingham Associates Program; W. T. Sanger, President, Medical College of Virginia.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 5, 1949

For the first week since June, the reported weekly incidence of poliomyelitis is below that for the corresponding week last year. A current total of 881 cases was reported, as compared with 1,071 last week (a decline of nearly 18 percent), 954 cases for the same week last year. An aggregate decline of 215 cases was recorded currently in 7 of the 9 geographic areas, partly offset by an increase of 25 cases in the West South Central and Pacific areas, in which declines were reported last week. The largest increases were reported in Iowa (12 cases last week to 35 currently), Texas (35 to 52), Michigan (50 to 63), and California (68 to 79). No other State reported more than 44 cases for the week except New York (126, last week 152), and New Jersey (53, last week 52). The total reported for the year to date is 39,045, as compared with 24,372 and 22,941, respectively, for the same periods of last year and 1946, and a 5-year median of 17,888.

Slight seasonal increases have been reported for 3 consecutive weeks in the incidence of influenza. The current total is 1,648 cases, as compared with 1,458 last week and a 5-year median of 1,612. No State reported currently more than 87 cases except Texas (1,072), and Virginia (197). The respective 5-year medians for these States are 785 and 211 cases.

A total of 76 cases of meningococcal meningitis was reported (last week 66, 5-year median 55), in 29 States. The largest numbers were reported in New York (9), Pennsylvania (8), Texas (7), California (5), and Missouri and Tennessee (4 each).

One case of anthrax was reported during the week, in California.

A case of plague, with fatal termination November 5, was reported at San Patricio, Lincoln County, New Mexico.

A total of 9,160 deaths was recorded during the week in 94 large cities in the United States, as compared with 9,068 last week, 9,031 and 8,704, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,706. For the year to date the total is 402,741, as compared with 404,126 for the same period last year. Infant deaths totaled 635, corresponding week last year 670, 3-year median 691. The cumulative figure is 28,755, same period last year 29,371.

Telegraphic case reports from State health officers for the week ended Nov. 5, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	----	----	----	19	----	15	8	----	4	----	----	----	10	----
New Hampshire	----	----	----	----	----	----	----	----	1	----	----	----	3	----
Vermont	----	----	----	1	----	----	3	----	3	----	----	----	19	----
Massachusetts	3	----	----	29	1	----	23	----	50	----	----	----	107	----
Rhode Island	----	----	----	----	----	2	10	----	8	----	----	----	6	----
Connecticut	----	1	----	5	----	29	15	----	8	----	----	1	72	----
MIDDLE ATLANTIC														
New York	5	----	----	61	9	186	126	----	[c] 53	----	----	2	201	22
New Jersey	----	----	5	13	----	43	53	----	19	----	----	1	181	----
Pennsylvania	4	1	----	29	8	40	29	----	28	----	----	----	133	----
EAST NORTH CENTRAL														
Ohio	6	----	----	15	3	53	22	----	96	----	----	1	73	17
Indiana	12	----	----	12	----	6	16	----	17	----	----	1	23	----
Illinois	1	1	3	19	3	67	44	----	19	----	----	----	84	4
Michigan [a]	1	1	----	88	1	37	63	----	57	----	1	----	116	----
Wisconsin	----	----	6	31	----	3	25	----	36	----	----	1	118	----
WEST NORTH CENTRAL														
Minnesota	1	----	----	69	2	5	25	----	15	----	----	----	7	----
Iowa	1	----	----	18	1	----	35	----	14	----	----	2	1	3
Missouri	5	----	1	3	4	18	18	----	15	----	2	2	16	----
North Dakota	----	1	8	2	----	----	1	----	2	----	----	----	2	----
South Dakota	----	----	----	3	----	1	1	----	[c] 3	----	----	----	----	----
Nebraska	1	----	----	5	----	----	13	----	3	----	----	----	----	----
Kansas	----	4	1	1	3	38	10	----	12	----	----	----	26	----
SOUTH ATLANTIC														
Delaware	----	----	----	10	1	----	1	----	2	----	----	1	10	----
Maryland [a]	4	----	1	7	----	29	12	----	[c] 14	----	----	1	44	----
District of Columbia	1	----	----	----	----	8	3	----	6	----	----	----	1	----
Virginia	11	----	197	7	2	65	9	----	49	----	1	5	32	----
West Virginia	6	----	31	27	1	----	7	----	24	----	----	1	20	----
North Carolina	18	----	----	11	3	----	2	1	68	----	----	----	27	----
South Carolina	7	----	13	1	1	8	2	----	16	----	----	----	2	3
Georgia	28	----	13	15	1	79	10	----	15	----	----	1	2	6
Florida	3	----	2	2	2	6	9	----	7	----	----	4	1	----
EAST SOUTH CENTRAL														
Kentucky	8	----	----	4	----	----	14	----	57	----	----	1	3	8
Tennessee	6	----	16	3	4	24	7	----	42	----	1	2	14	----
Alabama	13	----	27	49	----	29	5	1	28	----	----	----	5	3
Mississippi [a]	9	----	7	2	1	17	2	----	9	----	1	----	2	----

See footnotes at end of table.

Telegraphic case reports from State health officers for the week ended Nov. 5, 1949—Continued

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
WEST SOUTH CENTRAL														
Arkansas	6	----	56	1	----	9	15	----	8	----	2	2	5	----
Louisiana	2	----	----	1	1	8	1	----	2	----	----	2	2	2
Oklahoma	6	----	53	2	2	19	24	----	7	----	----	----	2	2
Texas	33	2	1,072	28	7	250	52	----	17	----	----	8	62	----
MOUNTAIN														
Montana	----	----	4	73	1	1	2	----	6	----	----	----	2	----
Idaho	----	----	7	8	----	3	17	----	[c] 12	----	----	----	1	----
Wyoming	----	----	----	10	----	2	----	----	----	----	----	----	5	----
Colorado	3	1	16	7	3	11	[1] 19	----	4	----	----	----	3	----
New Mexico	1	----	----	1	----	9	4	----	4	----	----	1	1	----
Arizona	3	----	87	18	1	13	4	----	3	----	----	----	5	----
Utah [a]	1	----	1	31	----	1	11	----	3	----	1	----	4	----
Nevada	----	----	----	----	----	----	----	----	----	----	----	----	----	----
PACIFIC														
Washington	----	----	----	39	2	----	14	----	40	----	----	1	24	----
Oregon	4	----	13	22	2	18	11	----	20	----	----	----	20	----
California	14	3	8	29	5	21	79	----	71	----	2	4	63	2
Total	227	15	1,648	834	76	1,176	881	2	997	----	11	45	1,560	----
Median, 1944–48	349	12	1,612	1,261	55	----	451	3	1,566	1	9	81	1,742	----
Year to date 44 weeks	6,443	678	88,330	593,795	2,917	66,114	[1] 39,045	551	64,980	44	971	3,273	53,755	----
Median, 1944–48	10,775	560	202,824	562,393	5,134	----	17,888	508	97,673	302	784	3,602	83,800	----
Seasonal low week ends	(27th) July 9	----	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	----	(11th) Mar. 19	----	(32nd) Aug. 13	(35th) Sept. 3	----	(11th) Mar. 19	(39th) Oct. 1	
Since seasonal low week	2,675	----	12,463	5,277	401	----	[1] 38,129	----	6,720	3	----	2,813	7,153	----
Median, 1944–45 to 1948–49 [b]	4,635	----	13,233	7,018	468	----	17,625	----	11,378	29	----	3,127	7,925	----

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods (1944–45 to 1948–49).
[c] Including cases reported as streptococcal infection and sore throat.
[d] Including paratyphoid fever; currently reported separately, as follows: Virginia 2, Georgia 1, Florida 3, Texas 2, California 2. Cases reported as salmonella infection, not included in the table, were as follows: New York 1.
[1] Poliomyelitis: Delayed reports, Nebraska 11 cases.
Correction for week ended October 22: Meningitis, meningoccal, South Carolina, 1 case instead of 12, and Georgia, 2 cases.
Anthrax: California 1 case.
Plague, human: New Mexico, Lincoln County, 1 case, fatal Nov. 5.
Alaska: Measles 97, pneumonia 4, scarlet fever 1, septic sore throat 4.
Hawaii Territory: Measles 1.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Weeks ended October 15 and 22, 1949.—During the weeks ended October 15 and 22, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Week ended Oct. 15, 1949

Disease	New-found-land	Prince Ed-ward Island	Nova Sco-tia	New Bruns-wick	Que-bec	On-tario	Mani-toba	Sas-katch-ewan	Alber-ta-	Brit-ish Co-lum-bia	Total
Chickenpox	2		27	1	136	113	13	30	52	7	381
Diphtheria			1		4	1					6
Dysentery, bacillary						3	7				10
Encephalitis, infectious			1				2	1			4
German measles					2	8		4	11	1	26
Influenza			14			1	3				18
Measles			41		135	50	36	68	59	25	414
Mumps			53		41	130	5	4	16	12	261
Poliomyelitis				1	21	23	1	3	5	3	57
Scarlet fever	1		1		33	28	5	1	21	9	99
Tuberculosis (all forms)	4		1	7	83	20	27	9	7	33	191
Typhoid and paratyphoid fever					11	4	2				17
Undulant fever			1			1					2
Venereal diseases:											
Gonorrhea	9	1	14	22	129	53	24	[1] 14	82	76	424
Syphilis	3	1	10	7	43	28	4	[1] 95	11	17	219
Whooping cough			4	3	35	27		2	2	2	75

[1] The total of 109 cases includes 94 discovered in northern Saskatchewan as a result of a recent survey.

Week ended Oct. 22, 1949

Disease	New-found-land	Prince Edward Island	Nova Scotia	New Bruns-wick	Que-bec	On-tario	Mani-toba	Sas-katch-ewan	Alber-ta	British Colum-bia	Total
Chickenpox			16	2	106	146	30	39	69	85	493
Diphtheria				1	12	3			1		17
Dysentery, bacillary					14	1					15
German measles					5	7	4	3	11	2	32
Influenza			13			2	5	2			22
Measles			18		146	99	73	55	30	245	666
Meningitis, meningococcal					1	1	1	1			4
Mumps			57	1	113	110	15	6	9	62	373
Poliomyelitis	1		13	4	3	21	6	8	8	1	65
Scarlet fever	3				52	22	11	4	28	6	126
Tuberculosis (all forms)	3		6	17	104	22	18	29		40	239
Typhoid and paratyphoid fever					9	1	1		1	2	14
Undulant fever			1		2	1	1		1		6
Venereal diseases:											
Gonorrhea	8		13	14	88	75	32	31	29	91	381
Syphilis	3		4	10	50	31	8	8	4	15	133
Whooping cough	1		2	1	163	22				1	190

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January–August 1949	September 1949	October 1949—week ended—				
			1	8	15	22	29
ASIA							
Burma	245						
Bassein	183						
Moulmein	2						
Rangoon	[1] 3						
Ceylon:							
Trincomalee	2						
China:							
Amoy	[2] 1						
India	70,621	6,655	[3] 1,076	[3] 270	[3] 650		
Ahmedabad		1					
Allahabad	12	1		2	2		
Bombay	[4] 6						
Calcutta	4,706	179	48	46	37		
Cawnpore	173	15	2				
Cocanada	11	1					
Cuddalore	2						
Lucknow	32	[4] 1					
Madras	348	81	1	1			
Masulipatam	1						
Nagpur	18	6		7			
Negapatam	26						
New Delhi	[1] 18	1			1		
Tuticorin	14						
India (French):							
Karikal	55						
Pondicherry	100						
Indochina (French):							
Cambodia	45						
Cochinchina	11						
Pakistan	24,408	[3] 343					
Chittagong	75						
Dacca	98	1					
Lahore	[1] 15	9					
Siam (Thailand)	9						
Bangkok	8						

[1] Includes imported cases. [2] Suspected. [3] Preliminary figures. [4] Imported.

PLAGUE

(Cases)

AFRICA							
Basutoland	[1] 42						
Belgian Congo	[1] 14						
Costermansville Province	3						
Stanleyville Province	[1] 11	1					
British East Africa:							
Kenya	5						
Tanganyika	15						
Madagascar	74	17				[2] 1	
Tananarive	6						
Rhodesia, Northern	2						
Union of South Africa	[3] [4] 64	[3] [5] 13	[3] 5	[3] [6] 3			
Cape Province	[3] 31	[3] [5] 11	1	2			
Orange Free State	8	2	[7] 1	[7] [8] 1			
Transvaal	4						

Footnotes at end of table.

PLAGUE—Continued

Place	January–August 1949	September 1949	October 1949—week ended— 1	8	15	22	29
ASIA							
Burma	441	3					
Mandalay	1						
Moulmein	[9] 6						
Rangoon	[9] 8						
China:							
Chekiang Province	7						
Wenchow	7						
Fukien Province	20						
Kiangsi Province	9						
India	[9] 26,526	909	293	47	109		
Indochina (French)	[10] 123						
Annam	66	1					
Cambodia	22	2					
Cochinchina	[10] 32						
Laos	3						
Java	111	114	41	[11] 11	[11] 7	[11] 8	
Jogjakarta Residency	78	114	41	[11] 11	[11] 7	[11] 8	
Siam (Thailand)	155	11			6		
EUROPE							
Portugal: Azores	4						
SOUTH AMERICA							
Brazil:							
Bahia State	[12] 13						
Pernambuco State	[13] 18						
Ecuador:							
Loja Province	4	2					
Peru:							
Lambayeque Department	10						
Libertad Department		1					
Lima Department	4	1					
Piura Department	7						
Venezuela:							
Aragua State	2						
OCEANIA							
Hawaii Territory: Plague infected rats [14]							

[1] Includes 2 cases of pneumonic plague. [2] October 1–10, 1949. [3] Includes suspected cases. [4] Includes 3 cases of penumonic plague. [5] Includes 8 cases of pneumonic plague. [6] Includes 1 case of pneumonic plague. [7] Suspected. [8] Pneumonic plague. [9] Includes imported cases. [10] Includes 7 cases of pneumonic plague. [11] In Jogjakarta City. [12] January 1–March 31, 1949. [13] January 1–April 30, 1949. [14] Plague infection has been reported in Hawaii Territory as follows: On Mar. 12, 1949, in mass inoculation of 2 pools of tissue from 10 rats (8 and 2), taken on Maui Island; on Mar. 16, 1949, in mass inoculation of 3 pools of 29 fleas (7, 12, and 10), on Aug. 4, 1949, in mass inoculation of 15 fleas, on Aug. 18, 1949, in a pool of 31 fleas, and on Sept. 15, 1949, in 49 fleas, all collected from rats trapped on the Island of Hawaii; also, on Oct. 5, 1949, in 1 rat found dead on the Island of Hawaii.

SMALLPOX

(Cases)

(P=present)

AFRICA							
Algeria	181	30			[1] 10		
Angola	[2] 560						
Basutoland		1					
Bechuanaland	2						
Belgian Congo	[3] 1,481	188					
British East Africa:							
Kenya	25						
Nyasaland	1,011	36	3	10			
Tanganyika	564	2					
Uganda	37						
Cameroon (British)	21						
Cameroon (French)	64	5					
Dahomey	350	30	13	3			
Egypt	3						
Eritrea	1						

Footnotes at end of table.

SMALLPOX—Continued

Place	January–August 1949	September 1949	October 1949—week ended—				
			1	8	15	22	29
AFRICA—continued							
Ethiopia	7	1					
French Equatorial Africa	175	58			[1] 2		
French Guinea	[1] 1						
French West Africa: Haute Volta	121						
Gambia	58						
Gold Coast	50						
Ivory Coast	254	42					
Liberia	3						
Morocco (French)	8	1					
Morocco (International Zone)	2						
Mozambique	195	62	9				
Nigeria	7,767	[3] 65	[3] 14	[3] 28	[3] 11	[3] 18	
Niger Territory	594	9					
Portuguese Guinea	1						
Rhodesia:							
Northern	6	3					
Southern	479						
Senegal	16						
Sierra Leone	109	4					
Sudan (Anglo-Egyptian)	[2] 205	12	1	5	1		
Sudan (French)	155	4					
Togo (French)	132	4			[1] 12		
Tunisia	1						
Union of South Africa	852	76	P	P	P		
ASIA							
Afghanistan	193	18					
Arabia	45						
Bahrein Islands	55	3					
Burma	[4] 1,612	65	2	11	7		
Ceylon	[5] 2						
China	964	1					
India	61,101	1,785	[6] 316	[6] 68	[6] 153		
India (French): Yanaon	1						
India (Portuguese)	222						
Indochina (French)	2,374	11			3	1	
Iran	288	7	8				
Iraq	[4] 427	48	33		20		4
Israel	5						
Japan	[7] 120						
Korea (Southern)	8,776						
Lebanon	[4] 130	1					
Malay States (Federated)	43						
Manchuria: Port Arthur	9						
Netherlands Indies:							
Java	[4] 9,499	1,602	393	207	232	172	
Riouw Archipelago	2						
Sumatra	[4] 174	[4] 20	2	10			
Pakistan	3,641	[6] 62					
Palestine	[8] 28						
Philippine Islands:							
Mindoro Island	11						
Romblon Island	[5] 4						
Tablas Island	2						
Portuguese Timor	4						
Siam (Thailand)	100	2					
Straits Settlements: Singapore	[4] 2						
Syria	493	13			31	68	
Transjordan	195						
Turkey. (See Turkey in Europe.)							
EUROPE							
Belgium	1						
Germany (U. S. Zone)	1						
Great Britain: England and Wales	[4] 20						
Italy	[9] 98						
Portugal	7						
Spain	2	1					
Canary Islands	6						
Turkey	92						
NORTH AMERICA							
Cuba: Habana	[4] 6						
Guatemala	4						
Mexico	[3] 46	57			10		

Footnotes at end of table.

SMALLPOX—Continued

Place	January–August 1949	September 1949	October 1949—week ended— 1	8	15	22	29
SOUTH AMERICA							
Argentina	[2] 155	[2] 61	8	9	------	------	------
Bolivia	[10] 35	------	------	------	------	------	------
Brazil	[2] 118	[2] 8	------	------	------	------	------
Chile	[5] 2	------	------	------	------	------	------
Colombia	[2] 2,070	[11] 23	[11] 9	------	------	------	------
Ecuador	[2] 566	29	------	------	------	------	------
Paraguay	[2] 6	------	------	------	------	------	------
Peru	2,230	------	------	------	------	------	------
Venezuela	[2] 1,374	------	------	------	------	------	------
OCEANIA							
Guam	2	------	------	------	------	------	------

[1] Oct. 1–10, 1949. [2] Includes alastrim. [3] In the port of Lagos. [4] Includes imported cases. [5] Imported. [6] Preliminary figures. [7] Corrected figure. [8] Aug. 1–31, 1949. [9] Includes 95 cases of varioloid reported in Rome Jan. 1–June 10, 1949. [10] Jan. 1–Feb. 15, 1949. [11] In the port of Medellin.

TYPHUS FEVER*

(Cases)

(P=present)

Place	January–August 1949	September 1949	October 1949—week ended— 1	8	15	22	29
AFRICA							
Algeria	64	4	------	------		[1] 1 ----	------
Basutoland	24	------	------	------	------	------	------
Belgian Congo	[3] 41	------	------	------	------	------	------
British East Africa:							
Kenya	76	------	------	------	------	------	------
Nyasaland	4	------	------	------	------	------	------
Tanganyika	1	------	------	------	------	------	------
Egypt	176	------	------	1		1 --	------
Eritrea	63	4	------	------	------	------	------
Ethiopia	497	11	------	------	------	------	------
Gold Coast	3	------	------	------	------	------	------
Libya	[3] 171	------	------	------	------	------	------
Madagascar: Tananarive	[4] 10	------	------	------	------	------	------
Morocco (French)	16	1	------	------	------	------	------
Morocco (Spanish)	22	------	------	------	------	------	------
Sierra Leone	[3] 1	------	------	------	------	------	------
Tunisia	64	4	------	------	------	------	------
Union of South Africa	[4] 108	7	P	3	P	------	------
ASIA							
Afghanistan	1,562	8	------	------	------	------	------
Arabia: Aden	[5] 2	------	------	------	------	------	------
Burma	5	------	------	------	------	------	------
Ceylon: Colombo	[3] 5	------	------	------	------	------	------
China	50	3	------	------	------	------	------
India	232	1	------	------	------	------	------
India (Portuguese)	31	13	2	------	------	------	------
Indochina (French)	18	------	------	------	------	------	------
Iran	159	2	------	------	------	------	------
Iraq	52	13	1	------	1	3	1
Japan	[3] 91	1	------	------	------	------	------
Korea (Southern)	1,147	5	------	------	------	------	------
Lebanon	[3] 2	2	------	------	------	------	------
Pakistan	590	------	------	------	1	------	------
Palestine	105	------	------	------	------	------	------
Philippine Islands: Manilla	[3] 1	------	------	------	------	------	------
Straits Settlements: Singapore	[6] 2	[3] 1	------	------	------	------	------
Syria	22	1	------	------	------	------	------
Transjordan	60	------	------	------	------	------	------
Turkey. (See Turkey in Europe.)							
EUROPE							
Belgium	[4][5] 5	------	------	------	------	------	------
Bulgaria	384	9	------	------	------	------	------
Czechoslovakia	20	2	------	------	------	------	------
France	5	------	------	------	------	------	------
Great Britain:							
England and Wales	------	[7] 4	------	------	------	------	------
Malta and Gozo	[3] 10	[3] 6	[3] 2	------	------	------	------
Greece	[4] 56	2	------	------	------	------	------
Hungary	20	------	------	------	------	------	------

Footnotes at end of table.

TYPHUS FEVER—Continued

Place	January–August 1949	September 1949	October 1949—week ended— 1	8	15	22	29
EUROPE—continued							
Italy	20						
Sicily	21						
Poland	260	7					
Portugal	6						
Rumania	417						
Spain	5	2					
Turkey	149	18	3		4	5	3
Yugoslavia	175	9					
NORTH AMERICA							
Bahama Islands: Nassau	[3] 1						
Costa Rica [2]	30	1					
Cuba [2]	3						
Guatemala	38						
Jamaica [2]	17	1					
Mexico [4]	174	7			1		
Panama Canal Zone [2]	12						
Puerto Rico [2]	32	4	1	1	2	2	
SOUTH AMERICA							
Argentina [2]	2						
Bolivia	53						
Brazil	2						
Chile [4]	152	10	2	3	4		
Colombia [4]	1,925	48					
Curacao [2]	5						
Ecuador [4]	245	47					
Peru	948						
Venezuela [4]	74	3					
OCEANIA							
Australia [2]	95	9	5	2			
Hawaii Territory [2]	9	2	1				

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.
[1] Oct. 1–10, 1949. [2] Murine type. [3] Corrected figure. [4] Includes murine type. [5] Includes imported cases. [6] One case type unspecified, 1 case murine type. [7] Imported.

YELLOW FEVER

(C=cases; D=deaths)

AFRICA							
Belgian Congo:							
Stanleyville Province D	5						
French Equatorial Africa:							
Bangui D	1						
Gold Coast C	22	2		1			
Birim District C	[1] 3						
Komenda Village [3] D	1						
Nkwanta Dunkwa Area D	1						
Oda Area:							
Akwatia C	[3] 5						
Atiankama C		[4] 1					
Bawdua C	[4] 2			[4] 1			
Esuboni C	[4] 2	[4] 1					
Oseikrome Village D	1						
Winneba Area:							
Apam D	1						
Akukuom D	1						
Nyakrom C	[5] 5						
Nigeria:							
Kaduna (Airport) D		1					
Lagos D	[6] 2						
Sudan (French):							
Bamaku D	[4] 1						
NORTH AMERICA							
Panama:							
Colon Province D	2	1					
Pacora C	[7] 8						

Footnotes at end of table.

TYPHUS FEVER—Continued

Place	January-August 1949—	September 1949	October 1949—week ended— 1	8	15	20	29
SOUTH AMERICA							
Brazil:							
Amazonas State D	1						
Para State D	3						
Ecuador:							
Napo Pastaza Province D	1						
Peru.							
Cuzco Department D	2						
San Martin Department D	1						

[1] Includes 2 suspected cases. [2] Near seaport of Sekondi. [3] Includes 1 suspected case. [4] Suspected. [5] Includes 2 suspected cases (1 fatal), and 3 fatal confirmed cases. [6] Imported. [7] Reported Jan. 15, 1949. Date of occurrence Nov. 11–Dec. 30, 1948. 5 cases (all fatal) confirmed, 3 suspected cases.

DEATHS DURING WEEK ENDED NOVEMBER 5, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Nov. 5, 1949	Corresponding week, 1948
Data for 94 large cites of the United States:		
Total deaths	9,160	9,031
Median for 3 prior years	8,706	
Total deaths, first 44 weeks of year	402,741	404,126
Deaths under 1 year of age	635	670
Median for 3 prior years	691	
Deaths under 1 year of age, first 44 weeks of year	28,755	29,371
Data from industrial insurance companies:		
Policies in force	70,071,379	70,827,848
Number of death claims	12,011	10,319
Death claims per 1,000 policies in force, annual rate	8.9	7.6
Death claims per 1,000 policies, first 44 weeks of year, annual rate	9.2	9.3

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world, (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 **DECEMBER 2, 1949** NUMBER 48

TUBERCULOSIS CONTROL ISSUE NO. 46

IN THIS ISSUE

Editorial—Social Services in Tuberculosis Control

Social Services in Tuberculosis—San Antonio Plan

X-ray Films, Screens, and Developers, X

Skin Tests to Detect Histoplasmosis in Dogs

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

CONTENTS

	Page
Editorial—Social services in tuberculosis control. Robt. J. Anderson	1539
Financial aid and case-work services to the tuberculous patient and family. San Antonio plan. James Zeck	1541
Characteristics of commercial X-ray screens and films, X. Willard W. Van Allen	1560
An evaluation of the histoplasmin reaction in the detection of naturally occurring histoplasmosis in dogs. John A. Prior, Clarence R. Cole, and Virginia Torbet	1562
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended November 12, 1949	1567
Communicable disease charts	1570
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended October 29, 1949	1571
Finland—Notifiable disease—September 1949	1571
Madagascar—Notifiable diseases—August and September 1949	1572
New Zealand—Notifiable diseases—5 weeks ended October 1, 1949	1572
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Plague	1573
Smallpox	1573
Typhus fever	1574
Deaths during week ended November 12, 1949	1574

Public Health Reports

Vol. 64 • DECEMBER 2, 1949 • *No. 48*

—Editorial—

Social Services in Tuberculosis Control

In the accompanying paper, "Financial Aid and Case-Work Services to the Tuberculous Patient and Family—San Antonio Plan," Mr. James Zeck describes the special effort made in one city to meet the social problems associated with tuberculosis. The article shows the effectiveness of the close relationships which were developed between the health department and social agencies in San Antonio. Such a combined attack against tuberculosis is an excellent example of the kind of approach which should be taken in tuberculosis control.

We have had years of experience with social work in sanatoria and hospitals. We know that this service is not simply "desirable"; it is necessary. It can help relieve the personal misery of facing tuberculosis day after endless day, and can help the patient and his family cope with the social and emotional problems created by the disease.

But the time to detect many of the problems with which the social worker deals in the sanatorium is not after the patient reaches the institution but at the time he first learns he may have tuberculosis. Early attention to these problems will lessen the patient's resistance both to the diagnosis and to the necessity for accepting and following medical recommendations. This has been brought out very clearly by our experience in the Seattle, Denver, Cleveland, and Washington, D. C., chest X-ray surveys. In all these programs the services of medical social workers were utilized in an effort to determine and meet the social needs of discovered cases immediately upon diagnosis.

In the course of normal tuberculosis control activities, the logical place for the utilization of such services as can be rendered by competent medical social workers would appear to be the chest clinic or the health department itself. In this fashion such services could be made available virtually at the moment the disease is suspected.

Unfortunately, there are still not enough fully trained medical social workers. The assistance which they can furnish both physician and patient is therefore not yet universally available. Community

This is the forty-sixth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control which appear the first week of each month. The series began with the Mar. 1, 1946 issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946 issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

social agencies, too, are not always in a position to furnish all the desired services to patients and their families. But it is possible, even under these conditions, to render at least partial service. In every city and county throughout the United States there is some resource, some sort of social agency which can be called upon to support the tuberculosis control effort.

The health officer responsible for tuberculosis control in his area should, as an integral part of his work, develop an understanding and working relationship with the social agencies in his community. Such a relationship would certainly benefit both agencies. The social agency will gain an insight into the specialized medical and public health problems associated with tuberculosis control and the health agency will have an opportunity to see the positive contributions which social workers and social agencies can make toward the effective management of tuberculosis patients.

Without such mutual understanding of each other's objectives, interests, and limitations, and without such cooperation, neither the health agency nor the social agency is capable of rendering maximum service to tuberculosis patients. As a result, the patient himself is perforce obliged to try to bridge the chasm between the two agencies in order to satisfy the physical, emotional, and social needs which his disease brings to light with such personal impact.

This should not and need not be true. The two agencies should work together so closely that urgently needed services become readily available to all patients at the earliest possible moment. To whatever extent this is possible, it deserves full exploration and aggressive effort.

ROBT. J. ANDERSON, *Medical Director,*
Chief, Division of Tuberculosis.

Financial Aid and Case-Work Services to the Tuberculous Patient and Family

—San Antonio Plan—

By JAMES ZECK, M. A.*

This is the story of San Antonio's effort to support its tuberculosis control program by strengthening a weak link, the provision of financial aid to tuberculous persons in need. In the early 1940's when our tuberculosis control activities were broadened and extended, it became clear that the inadequate system of financial protection was a great weakness. The reasons for including financial protection among the objectives of tuberculosis control are obvious and well recognized. The methods by which such protection can be provided are not so well established. Various expedients have been advocated but so far there is no agreement about the most effective way of solving the financial problems of families in which a member has tuberculosis.

This report presents the experience of one community—San Antonio. The writer believes that this project is significant as an example of one method of meeting this need. He does not wish to give the impression that this is the only or the best program which could be developed. It has certain unique aspects because of special factors in the demography of the city.

San Antonio's Tuberculosis Problem

San Antonio, Tex., has been a military center ever since Spanish days. Its 1949 population is believed to be between 350,000 and 400,000. For decades the city has had the highest tuberculosis death rate among the Nation's cities of 100,000 or more population. While the rate has dropped markedly in the past 5 years, San Antonio's relative position among the large cities appears to be the same as in the past.

Until 25 or 30 years ago, San Antonio, "where the sunshine spends the winter," was one of the places to which the Nation's doctors sent their tuberculous patients. O. Henry's "Fog in Santone" is a bitter story about health seekers in San Antonio.

Sidney Lanier was also one of San Antonio's health seekers. He

*Director, City-County Tuberculosis Control Board, San Antonio, Tex. This paper is a more detailed account of the San Antonio plan which Mr. Zeck described at the 1949 meeting of the National Tuberculosis Association. The speech given at that meeting will be published in the 1949 Transactions of the National Tuberculosis Association.

wrote in 1873 that "one of the recognized 'institutions' of the town is the consumptives, who are sent here from remote parts of the United States and from Europe, and who may be seen on fine days in various stages of decrepitude, strolling about the streets" (*1*).

So strongly has the old condition of things imbedded itself in people's minds that in spite of recent statistics to the contrary, some of the people of the community, including some local doctors, continue to insist that tuberculosis is a problem caused by people who come into the city with the disease, and that much of it is of local origin. That attitude creates a callousness to the sick who are said not to "belong" in our community. Sometimes it almost seems that a person must be an "old settler" to be considered a legal resident for the purpose of admittance to our State and county sanatoria. The attitude is reflected in State laws which close sanatorium doors to persons who may have lived in the Nation or the State all but the first few days of their lives, but, as our State law puts it, are not "citizens of Texas."

Comments on this point have been made as follows: ". . . In 1940, 312 deaths from pulmonary tuberculosis occurred in San Antonio. However, when the number of deaths among nonresidents is subtracted from 312 and the number of San Antonio residents who died of pulmonary tuberculosis elsewhere is added, the total comes to 321." (*2*).

In his book, A Century of Medicine in San Antonio, Dr. Pat Ireland Nixon swings hard at those who use the "inspired vindication" of laying tuberculosis deaths to the outsiders who come to San Antonio too late to recover health, instead of recognizing that the fatalities are principally from "that large unsewered, Trans-San Pedro Creek district which includes our 90,000 Mexicans" (*3*).

It may also be of interest to note here that in the years 1939–43 the Michigan State Department of Health, in cooperation with the Michigan Beet Growers' Association, had a screening program in San Antonio to stop the importation of tuberculosis and venereal diseases into that State from South Texas. A team of workers from the Michigan State Health Department set up fluoroscopic equipment next door to the official hiring agency in San Antonio. The hiring agency would not contract for the seasonal agricultural labor of a person who could not produce a "clean health" card from the examining unit. Many people who thought themselves well enough to work in the northern fields were found to be tuberculous and were reported to the San Antonio Health Department (*4*).

The number of deaths from tuberculosis in Bexar County has ranged between 350 and 400 a year for the past several years. Using the accepted standard of 3 beds (not less than 2½) per annual death, the number of available beds should be not less than 875—more properly

1,200—for the hospitalization of tuberculous residents of Bexar County. Until the middle of 1949, the county sanatorium had only about 70 beds. It is expected to have an ultimate capacity of 150 when the new addition is in full use and remodeling of old quarters is completed. It is estimated that from 60 to 75 patients from Bexar County are hospitalized at State sanatoria. The State as a whole has about a fifth of the recommended number of sanatorium beds if the standard is based on the annual number of tuberculosis deaths.

The maximum number of beds available in Bexar County is 225 at any one time in all hospitals exclusive of some veterans facilities and a few beds in sanatoria operated by private organizations. San Antonio's county and city ratio, even with a recent addition to the county sanatorium, is even less favorable than the position of the whole State. Consequently, in San Antonio we are forced to try to create literally hundreds of "one-bed sanatoria" in the tiny one- and two-room shacks that are the homes of families of one to twelve persons.

According to the policy statement of the State Board of Control there is a limitation of 9 months on stay at the State Sanatorium (6 months until a few years ago). The rationale for this policy is that more citizens of the State have an opportunity for sanatorium care. It enables doctors to use the limited number of beds to teach a larger number of patients how to "take the cure" so that they will be able to continue good care on return to their homes. The Hospital Number of the Journal of the American Medical Association, May 7, 1949, lists the 1948 capacity of the State sanatorium at 935 beds, with an average census of 752 and 1,506 admissions during the year. The same publication for August 14, 1948, showed 1947 capacity as 955, average census as 617, and 1947 admissions as 1,343. The 1949 Texas legislature created a new board which assumes charge of the sanatorium and other State hospitals and special schools.

In addition to the shortages in hospital facilities, there has never been more than a fraction of the number of public health nurses needed to follow up tuberculosis patients. With several health conditions worse than those of the average American community, there were one-fourth the number of nurses called for by standards. There is serious understaffing of all other public health activities as well.

These conditions were true when the war came, and they are still true in the main. As hundreds of thousands of men began to flow through the nine military establishments surrounding San Antonio, the armed forces were concerned about the health of their personnel. The United States Public Health Service lent medical help to the city to meet the additional health problems brought to it. A physician from the Tuberculosis Control Division became head of a newly

created tuberculosis control division in the city health department. He learned early that he could send relatively few patients to the sanatoria, and that in many cases he could not even tell the patient to stop working and go to bed at home or to "isolate" himself from the many other members of his family in two or three small rooms. It was futile to tell a man whose family could have no other income than his wages to start taking treatment for tuberculosis. Nurses worked under constant frustration because even the simplest adequate diet for a tuberculous family was impossible, and there was no money for the other essentials.

Not long after arriving in the city in 1944, the Public Health Service physican and the director of the city health department organized a Tuberculosis Council. The Council included representatives from the governing bodies, and from the city and county health departments, the tuberculosis association, social agencies, and others who were particularly concerned about the blot of tuberculosis on the community. This was the initial step in the development of the City-County Tuberculosis Control Board. However, before discussing this agency, some of the additional factors which made it necessary must be presented.

Social Characteristics of the Community

When World War II came, it froze a number of health hazards in the city. A count by the health department showed that more than 10,000 homes within the city limits were not on sewer lines and had only pit toilets. Most of these thousands of homes were not on water lines. Their occupants bought their water from the peddlers' tank trucks at 25 to 40 cents a barrel. The barrels stood outside their houses. Many families of 4 to 10 people lived in 2 or 3 small rooms.

In 1942 the power company of San Antonio wanted to find out why the gas and electric lines they extended into the Latin-American section of the city were not producing expected revenue. They cooperated with the health department in making a social-economic

Table 1. *Representative annual income for low economic groups, by family and individual, for major groups, San Antonio, Texas, 1942*

Group	Typical annual income		Persons per family
	Per family	Per individual	
Latin-American	$622.34	$141.44	4.4
Negro	937.50	284.09	3.3
Anglo-American	949.02	256.49	3.7

study in connection with a tuberculosis survey that year. Samples of the three important groups of the community showed that the prevalent annual family incomes were as listed in table 1 (*5*).

The representative annual family income ($622) for Latin-Americans was the lowest among the three racial groups. Yet they comprise between 40 and 45 percent of the population. They also have the largest family size (4.4 persons) among the racial groups.

Potential Latin-American customers of the power company had no money with which to buy stoves and electric fixtures, nor to connect to the gas and electric lines.

Table 2 shows the tuberculosis death rates for the three major population groups.

It is clear that in San Antonio the ravages of tuberculosis are inversely proportional to income. At a meeting of the San Antonio Tuberculosis Council in 1946, Dr. R. G. McCorkle, tuberculosis specialist, was asked the cause of the marked reduction in the city's tuberculosis death rate during the war years. He gave almost all the credit to civilian job opportunities at the nine military establishments that surrounded San Antonio, where many Latin-Americans could for the first time earn from $125 to $200 a month. This greatly raised their standard of living.

That was the 1942 picture. The 1949 picture differs in only a few respects: war-fostered higher family incomes and the unique health and social agency—the City-County Tuberculosis Control Board.

In most States, public assistance is provided under the Social Security Act (Aid to Dependent Children, Old Age Assistance and Aid to the Blind), and by general assistance. The three special programs are supported by a combination of Federal and State funds. General assistance to those not eligible for the three categories is provided by State and local funds only.

It must be recognized that within each of these three categories there are various eligibility restrictions so that not all the children,

Table 2. *Tuberculosis deaths per 100,000 population, San Antonio, Texas, selected years*

Group	Year		
	1939	1941	1944
Latin-American	246	229	143
Negro	80	105	88
Anglo-American	55	62	46

aged,or blind get assistance through Social Security funds. Those not eligible within these categories plus all of the many who are neither children, aged, nor blind must look to general assistance funds for help.

Resources in Texas for meeting the financial needs of tuberculous or other families were very meager in 1942. The State Department of Public Welfare administers categorical assistance over the entire State, and Texas law places responsibility for general assistance upon the counties. But the law also limited the amount of taxation for all purposes, and Bexar County had no special tax funds for aid to families and individuals not eligible for the categorical assistance. There is no planned program of general assistance to which needy persons can turn for help.

However, Bexar County has accepted the responsibility for health and welfare to the extent of providing office space in the Court House to several private social agencies, and making monthly grants to various welfare agencies and institutions.[1] It also operates a home for the aged, and county correctional schools for boys and girls. It participates in the operation of the city-county hospital and, since the establishment of the Tuberculosis Control Board, budgets funds for this city-county agency.

The lack of public general assistance imposed an impossible burden on the private agencies and was the primary reason for setting up the special agency for relief to the tuberculous, in effect, a fourth category of assistance to a special group.

The private social agencies supported by the Community Chest were so overloaded by the relief demands upon them that they periodically had to refuse to take new applications. A tuberculous family might have to wait for months until enough recipients were removed from the case load so that case workers could reach the applicants on the waiting list. When a family did get financial aid, the budgetary limitations of the agencies made it necessary to spread relief thin and assistance was less than adequate for absolute necessities.

The drain on the existing social agencies for relief to tuberculous families, together with the information supplied by the Public Health Service physician, led to the appointment of a committee by the Community Chest to study ways and means to improve the situation. They learned that a substantial part of the expenditures of the family agencies financed by the Community Chest was going as relief to tuberculous families and that other proper activities of the case work agencies were suffering consequently. The committee recognized

[1] San Antonio Social Welfare Bureau, $100; San Antonio Association for the Blind, $75; Children's Service Bureau, $100; Protestant Orphan's Home, $100; Home of the Good Shepherd, $25; Saints Peter and Paul Orphanage, $25; St. Joseph's Nursing Home, $25; Ella Austin Orphanage, $25.

that without adequate financial aid much of the tuberculosis control program would be nullified. If there had been a local department of welfare with legal authority to administer funds for general relief, the problems could have been met without an entirely new special program. But since this did not exist, it was necessary to consider other methods. New legislation was required.

A committee of citizens, including a number of those who had made the study for the Chest, was organized and was offered the help of the Chest and the Community Welfare Council (Council of Social Agencies). The new committee gathered its facts and approached the public officials to set up a program to provide financial aid to the tuberculous families who needed it. Neither the county nor the city had funds for such a purpose. But they had no objection to the passage of State legislation that would make it possible for a county and its cities to levy taxes for financial relief to needy tuberculous persons and their families, and to organize a joint program for that purpose.

An attorney who was interested in this problem studied existing laws and prepared a bill for introduction in the 1945 session of the Texas legislature. It was presented only a month before adjournment, but intensive work by the citizens' committee bore fruit. When the bill came to vote, it was passed with no opposing votes in the Senate and only one "no" in the House.

The new act [2] permitted organization of a city-county tuberculosis control board in any county with a population of 200,000 or more. If the voters of the county and any constituent city or cities approved it in an election, the county and cities could levy taxes which would be used for needed financial aid to "persons suffering from tuberculosis (who had lived in the county not less than 6 months on date of application) and to dependent members of their immediate families," and for administrative costs. This tuberculosis control board could cooperate with any public or voluntary organization "in order to alleviate, suppress and prevent the spread of tuberculosis within the county, as a public health function."

Except for staggered initial terms, the members of such a board would be appointed for 3-year overlapping terms. There would be no fewer than five members, and there could be more, depending on how many cities within the county participated. One member each would be appointed by the county commissioners' court and by the mayors of the participating cities. The county board of health and the board of health of the largest city within the county would also each appoint one member. The last member would be appointed by a panel of district court judges.

[2] Senate Bill No. 399, 1945 Session This amends certain sections of chapter 219, Acts of 1927, Regular Session, and adds the new section 6-A which permits creation of the city-county tuberculosis control boards.

Under the act the funds raised by the county and its participating cities would be pooled, and the tuberculosis control board would report quarterly to the taxing jurisdictions on the use of the pooled fund. The county could levy up to 10 cents on each $100 of assessed property valuation and each city up to 5 cents on each $100 valuation.

A mass meeting was held before the bill was introduced in the legislature, and the graphic pamphlet "Like a Sore Thumb" (*6*) was used effectively. This pamphlet was published in February 1945. Its charts, line drawings, and pictographs in black and red dramatized the problem of tuberculosis in San Antonio. The material was taken largely from the records of the San Antonio Health Department and various welfare agencies. An advertising firm assisted in printing and distributing the booklet which was financed by the Bexar County Tuberculosis Association. It described tuberculosis in San Antonio in striking detail through the presentation of some of the following facts: that tuberculosis was the third most common cause of death in San Antonio in 1944 (a good year!); that at least 61 percent of the tuberculous population were long-time residents of the community (and incidentally that a number of San Antonians had died of tuberculosis elsewhere). The pamphlet pointed out the need for early case finding, isolation, adequate medical treatment and rehabilitation, and finally stressed the economic problems.

After the bill became law, a second mass meeting was called to plan for the special election that would be called. This election—to give the voters an opportunity to vote authorization to the taxing bodies to make the proposed levies—was called for July 25, 1945. A committee was organized by the Community Welfare Council to telephone and urge people to vote on the proposition. A call was sent out for volunteers, each to telephone 50 persons in the telephone directory, and 800 persons agreed. Private subscriptions totaling over $8,000 were used to place a series of advertisements in the daily newspapers and four weeklies, and for radio time. In the 10-day period, starting July 16 and ending on election day, five radio stations carried twelve 15-minute evening talks and 536 spot announcements of 50 to 100 words, day and evening.

This example of community action is a thrilling story in itself. Although it had been predicted that the voters would defeat the measure, it actually was carried two to one, even though the vote was light.

In accordance with the State law, the Board was appointed in August 1945 and the persons most active in the campaign became members. These included the Community Welfare Council board member, who had been chairman of the citizens' committee, the attorney who had drafted the State law, the businessman who had raised the campaign fund through private subscriptions, the president of the Taxpayers'

Defense League, a leading tuberculosis specialist, and a woman who had been active in many civic undertakings.

The new Board met with the county and city officials to ask for appropriations so that the work could begin immediately. The county declined to appropriate funds until 1946, when collections of taxes would have brought in the first amount especially budgeted for tuberculosis control. However, the city of San Antonio arranged for borrowing against the tax collections, and the first funds became available late in October. The private social agencies prepared their case histories for transfer to the new agency, and the first assistance checks were sent out November 1, 1945.

The Philosophy of the New Agency

The development of the agency introduced a new concept in public welfare and public health. Basic to all public assistance is the concept that all persons of any race, creed, or color regardless of the reason for need have a right to the necessities of life. Existing categories under the present Social Security Act and general assistance have some health implications. In the blind program obviously, and in the other two (Aid to Dependent Children and Old-Age Assistance) the chief cause of dependency is often physical disability of the breadwinner. But probably never before has public relief been used as a health measure to buttress a program of tuberculosis control. In its earliest meetings, after its organization in August 1945, and before financial aid had begun, the new Board declared its program to be one of promoting the public health.

This emphasis on the public-health nature of the agency, with financial assistance considered as a means to that end, makes a great deal of difference to the clients. Case workers attempt from the first interview to implant and nourish the understanding that this is a community service, like public schools, available to all eligible persons who need it and will use it for the purposes intended. Once patients perceive that the financial assistance is in the nature of wage-replacement which the community provides to make it possible for them to settle down to the job of getting well, their attitude toward treatment and the assistance becomes healthier. There is less sensitivity in accepting such temporary aid.

Since tuberculosis is frequently associated with lack of income sufficient to buy food, housing, clothing, early medical care, and the educational advantages with which to make maximum use of whatever income one does have, there are numerous instances when it is necessary to do more than replace the income that tuberculosis stopped. If we merely replace an inadequate former income, we may be doing nothing to restore the health of the sick person or to build

up the resistance of the other members of the family to the tubercle bacillus. It is often necessary to raise the standard of living above the previous dirt-floor level.

The Board is convinced that the financial assistance will show its best results only if it is part of a good social case-work program. It decided early that the director of the new City-County Tuberculosis Control Board should be a well-qualified social worker. The associate secretary of the Community Welfare Council acted in this capacity temporarily until January 1946 when the full-time director was employed. Other qualified social case workers were not available for positions in the agency then and several were borrowed for 1 and 2 months from the Family Welfare Association until the board could build up its own staff. There is freedom to employ the best-trained case workers available without regard to State or local residence, and the size of the case loads is consistent with good case-work service. Case-work services, as well as financial assistance, were accepted as the responsibility of the staff in accordance with the increasing awareness of the social implications of illness. The recognition of a need for professional social service of high quality is a further indication of the advanced thinking and sound planning of the Board's founders.

Policies and Procedures

The Board determined before the first assistance was given that inadequate aid would be wasteful. Unless enough was provided to buy sufficient food and other essentials, any amount spent would only prolong misery and produce no benefits. The Board stated its program was one of public health with public assistance a part of the health program.

With the Mexican dietary habits of the largest group of patients in mind, the Public Health Service physician heading the tuberculosis division of the health department modified the quantity charts of Family Food Plans for Good Nutrition (7) to increase the amount of certain protective foods. This chart was modified to provide for differential quantities according to sex, age, degree of physical activity of well members, "forced feeding" of badly underweight patients, pregnant women or nursing mothers.

The nutrition consultant from the State department of health agreed to take this quantity chart and arrive at average costs in San Antonio. She visited 33 markets, mainly the smaller ones in the areas where the largest numbers of patients live, and submitted weighted average costs for every classification in the chart. These resulted in proposed increases of from 5 to 40 percent (depending on family composition) in the food allowances taken over at the beginning from financially embarrassed private agencies The new schedule was adopted by the Board without modification, with several Board

members reiterating an earlier determination to provide adequately for essentials. Two later studies resulted in the adoption of still higher allowances as food costs rose. The State Health Department has not had a nutrition consultant on its staff for well over a year, but periodic reviews of food costs are planned as other competent persons are found by the Tuberculosis Control Board. Food allowances are increased for special diets ordered by clinics.

Allowances in the family budgets for house payments and rent are made on an actual cost basis. Since decent and sanitary housing is a "must," and the large proportion of tuberculous persons live in the cheapest and worst housing, the agency encourages its clients to improve their housing and assures them of willingness to make reasonable increases in rent allowances when it is possible to find better quarters. When taxes come due on homes owned or being bought by clients, special allowances are made for payment. This avoids jeopardizing a family's security, and promotes the patient's peace of mind.

Items for utilities, transportation, limited amounts of life insurance, and household and some personal expenses are included in computing monthly budgets. Periodic allowances, consistent with the region's climatic requirements, are made for purchase of clothing. To make certain that hygienic and healthier living will be possible, funds are provided for necessary beds and bedding, and for other indispensable household equipment.

Remembering that the means for healthful living is an absolute requisite in the care of patient and family, the Board has authorized provision of funds to meet such essential needs, but with not a whit of extravagance. It feels keenly its responsibility to the citizens of the community who must support the program through the taxes they pay. In computing how much cash assistance the family group shall receive from the agency, the cost of the allowable items for a month is totaled. From this total, the sum of monthly incomes and resources is subtracted. Checks for the difference are sent once or twice a month, depending on the amount of the deficit and the circumstances of the case.

When a parent becomes ill, some working children may at first resent the possibility of having to contribute all, or a substantial part, of their earnings to the family. The agency expects working children to pay their own way and to assume some family responsibility if they earn enough to do so. But it also believes that the long-range good of the children, the family, and the community is best served if children keep part of their earnings so they can do what others of the same age and economic status are doing. Our experience has shown that most young people will assume their full share of responsibility if they are handled

with patience and with sympathetic understanding of their own personal needs as well as the family's.

The agency never requires children to leave school and take jobs in order to support their families. However, if of their own volition and against advice they stop school attendance at legal age or beyond, they are expected to support themselves.

Often the problem is not the out-of-school child who will not work, but the proud family which would put a child to work at the earliest legal age, 14, rather than accept the financial assistance of a social agency. In one such instance the parents would have taken their daughter out of the eleventh grade. If they had done so, her earnings as a kitchen helper, or other unskilled worker, could hardly have exceeded $60 a month. Another year in high school while the agency supplemented the family income made it possible for her to complete her commercial course and to take an office position at $120—soon raised to $135. She was able to assume the family's financial deficit formerly supplied by the agency, and has been doing so the past year and a half, for her father has not yet recovered. The temporary additional expenditure while the daughter completed high school has saved the taxpayers' money, has put the girl on a higher competitive level for jobs, and has made the family financially independent at a much earlier date.

The agency is able to continue supplementary financial assistance until the ex-patient is able to work full time, or—if he needs vocational retraining—through the period of retraining and until medical opinion permits full-time work, or until part-time earnings are sufficient to cover needs.

An unmarried woman who had been "on the cure" in a rented room for 4 years, after completing the maximum 9 month's hospitalization permitted at the State sanatorium, was finally ready for vocational retraining. She had left high school upon completing tenth grade and had supported herself first as a waitress and then as a civilian mechanic's helper at an Army air field until she broke down with tuberculosis. Return to her former work would have invited a relapse. However, her tests at the vocational rehabilitation office disclosed aptitude for office work. The agency continued financial assistance during the year she spent in business college, while the vocational rehabilitation organization paid her tuition and provided money for incidental expenses. She was placed in her first office job at $125 a month, and reports in the 8 months since that she is happy in the new kind of work and that she has already had a raise. The new occupation reduces her chance of relapse.

Experience everywhere has shown that a certain proportion of patients will not isolate themselves for the protection of family and

community, and will not follow medical advice on rest and treatment. Good social case work and medical and nursing guidance helps the majority of them adjust to the necessity of modifying life-long habits. In some instances, however, it is necessary to exercise authority in dealing with the few whose activities fail to promote the public health.

Coordination of Agency Program With Other Community Services

By resolution, after agreement with the County Medical Society, the agency accepts medical certification of tuberculosis only from the City Chest Clinic which accepts patients from the whole county. Physicians who wish to refer their patients to the agency for financial assistance first release them to the clinic.

The State Department of Public Welfare limits Aid to Dependent Children to $27 for the first eligible child, $18 for every additional child, and a ceiling of $81 per month to any family of children. The Tuberculosis Control Board supplements the ADC in most families in which there is tuberculosis. This brings the income up to the Control Board's budget. By agreement with the local office to the State Department of Public Welfare, case-work services to families in which both agencies provide assistance is given by the Tuberculosis Control Board. SDPW field workers naturally retain all responsibility for determining eligibility for State aid, and make the home visits needed to establish it.

The City-County Tuberculosis Control Board cooperates with the City Chest Clinic and with the nursing and other divisions of the city and county health departments. It also works with the county tuberculosis association, which—by long-established practice—processes applications to county and State sanatoria for the county judge, who is charged with the responsibility by State law. The ways in which the nutrition consultant of the State health department is used have been described.

The homemaking teachers of the school system have agreed to give guidance in food management and other aspects of homemaking to selected families who ask for help. Certain settlement houses provide the usual settlement activities for members of agency families. One of them has sewing classes which may be joined by the agency women along with the other women of the neighborhood.

As already indicated, both diagnosis and out-patient treatment of tuberculosis are available at the City Chest Clinic. Treatment for conditions other than tuberculosis is not so simple. The tax-supported general hospital, with its out-patient clinics, is gradually reopening after having been shut down almost completely for nearly 2 years because of financial difficulties. During that period two private hospitals and their out-patient clinics did what they could to care for the increased "free-care" patient load. But both ruled that they could

not accept tuberculous persons in their general clinics. Furthermore, the county physician would not knowingly make or send his assistants to make emergency home visits to tuberculous patients. On the other hand, the Tuberculosis Control Board decided that it could not establish the precedent of paying for private medical care for its clients when the community pattern was to provide care to those who could not pay for it in the tax-supported hospital, with the other two larger hospitals of the community taking the overflow. Its board members added their influence to that of other citizens to reopen the public facilities.

As has been indicated, the Tuberculosis Control Board works cooperatively with the Vocational Rehabilitation Office in retraining patients. It also cooperates with the other agencies of the community, both public and private. Being a health and social agency, it subscribes to and uses the Central Index (Social Service Exchange). It also has membership in both the health and family divisions of the Community Welfare Council (Council of Social Agencies).

Social Problems and Social Work Needs

There are three State sanatoria for the tuberculous. An additional institution, recently vacated when Negro patients were moved into the new State sanatorium for Negroes in the northeastern part of the State, is being filled with tuberculous women from the State hospitals for the mentally ill.

The Texas State Sanatorium, near San Angelo, the first and largest in the State, accepts only minimal and certain moderately advanced cases of tuberculosis. It limits their stay to 9 months, regardless of the condition or progress of the patient at the end of that period. Noncitizens may not be admitted. At the Bexar County Sanatorium, on the other hand, aliens may be admitted if someone pays the institution the full cost of their care. Neither pneumothorax nor any form of surgery is performed at the county sanatorium.

Inadequate treatment facilities lead to the ridiculous but grim situation where the patient—alien or citizen—with moderately advanced or far advanced tuberculosis, in need of pneumothorax, cannot be admitted to a public sanatorium, but must try to rest in his crowded shack and travel by bus to and from the City Chest Clinic for refills. Sometimes he has to walk as far as a mile between his home and the bus line. Then he has several hours' bus travel to and fro, and the necessary wait for his turn at the clinic. It is obvious that with only one bed for every four needed, and with regulations and other conditions that make it impossible for some patients to use even the beds available, the great majority must take their treatment at home.

It is difficult to create hundreds of one-bed and two-bed sanatoria in the county and city and make them halfway acceptable when the continuing housing shortage usually makes it impossible to provide a separate room for the patient.

None of the State's tuberculosis sanatoria, including the main one of over 900 beds, has a medical or any other kind of social worker on its staff to help patients with their personal or family problems. Of the county sanatoria, only two have provided in their plans for the part-time services of a medical social worker. The executive secretary of the county tuberculosis association also visits the sanatorium frequently and provides various services to the patients. The Bexar County Sanatorium has no provision for social service, but the need is met in part when case workers from the Tuberculosis Control Board periodically visit patients from the families known to the agency. When others request service at the same time, the agency is prepared to provide it. Patients want to talk over the problems of their families in town, and the things that worry them.

"The furniture company was sending letters to my wife about the balance we owe, but now they have sent two telegrams, and she is scared." The case worker calls the store, explains the situation, and secures postponement of payment of the balance until the man can return to work. Or one patient says a neighbor told him on a visit to the sanatorium that his wife is "running around" with a former boy friend. He cannot rest because he wonders whether it is true, and if so, what he should do. The case worker calls on the wife in town, learns the story is true, and that the wife plans to get a divorce and marry the other man. A meeting of husband and wife is arranged so that they can talk it over, and the husband is gradually helped to adjust to the inevitable divorce, and to resume his "rest cure."

The mother in the sanatorium may be upset because her husband, who works an evening shift, has told her that Mary, age 15, came home after midnight several times, and the school reports a number of absences. Mary is asked to come to the agency office after school. The case worker discusses her interests and finds that the girl would welcome referral to the vocational counselor, because she sees no use in "taking these courses that don't mean anything to me." She begins to understand why her mother is worried about her late hours and the company she keeps. There are lapses, but Mary gradually finds her way, both in school and out of it.

In some cases it takes no more than some manipulation of the environment, such as arranging medical care for daughter Guadalupe, to make it possible for the patient to rest better in the sanatorium. Even the limited experience of the Tuberculosis Control Board in providing case-work service to patients in the county sanatorium

leads to the conviction that good social service in every sanatorium would greatly reduce the number of departures without medical consent. It would also promote benefits from treatment.

The necessity for home treatment intensifies some of the problems of the tuberculous and their families. A short illness of a member of a family may solidify the group, but the long-continued presence of the tuberculous person in a badly overcrowded home which must double as a hospital often becomes a trial to the well members. It is not easy for those who are not themselves sick to try to observe hospital rules 16 to 24 hours a day. For the patient it is equally trying. Attempting to follow a rigid rest schedule when nobody else in the home is doing so requires a brand of application that is possessed by very few—especially when they do not even have a separate room from which to shut out the home activities and distractions.

It is hard for children to understand why dad or mother will not pick them up now or caress them as they used to. And it is not easy for the sick parent to be firm about keeping the children away, and yet to do it in such a way that the youngsters will know they are still loved. These complications of home treatment may seem trivial to those who have not had to work with the problems, but their cumulative effect on patient and family are disrupting, to say the least. Social case work can help patient and family to understand themselves and to smooth the harder road of "home care."

One aspect, in particular, of the work in San Antonio diverges from desirable practice. Patients are given instruction in isolation techniques at the City Chest Clinic after they have been given the diagnosis by the doctor. But many have not really heard what the nurse said because they were thinking of the implications of the diagnosis they had just received from the doctor. It would be desirable for a public health nurse to visit the patient at home within a few days after diagnosis, and then make several more visits at short intervals to teach by repetition. Other members can also be told what the patient has heard, and the nurse can teach in the home setting, taking into account what the patient and family have to work with, and under what conditions they will have to make their adaptations. Unfortunately, the extreme shortage of nurses in the city health department means that many newly diagnosed patients are not visited by a nurse in their homes until months have gone by. Since the financial aid given to families by the Tuberculosis Control Board is for the promotion of public health, the case workers from the agency must remind the patients and the families about the clinic instructions in regard to rest and isolation. It would be far more desirable if this were done by nurses, who would be better equipped to do it. But the Board of the agency feels that the financial invest-

ment in families must be protected even if its case workers are not the logical ones to do the teaching.

Considering the handicaps of housing, sanitation, hospitalization, and medical care under which tuberculous patients of the community are placed, it is a wonder that so many do recover their health. There is every reason to believe that a much higher proportion would recover in less time and with a much smaller total outlay of money if case finding, hospital beds, and clinic and nursing facilities were increased several fold.

Social and Financial Services

During the calendar year 1948 the City-County Tuberculosis Control Board served 726 families and unattached single individuals (households, or "cases") in whose families tuberculosis either created or accentuated a problem. The specific services given were:

Type of Service	*Cases*	*Remarks*
Total	726	Case is defined as families or unattached single individuals.
Financial aid to cases	415	Aid offered for varying lengths of time. Average monthly load 244.
Case work only	178	No financial aid indicated.
Rejected or ineligible applications.	133	Investigation indicated case was not eligible or functions of agency did not offer type of service needed.

During the first 8 months, referrals were at an average of 29 per month, with a high of 43 in March. In the last 4 months of the year, they averaged only 17. It is believed that this great difference is due to two causes. A slight increase in case finding in the earlier months was followed by a marked slump in case-finding activities because of the withdrawal of the full-time director of the city health department's division of tuberculosis control in the latter months.

There were 300 referrals of newly diagnosed persons during the year. While every patient diagnosed at the clinic receives a referral to the agency, it is believed that in some instances neither the patient nor a member of the family comes to the office, and that the number of new diagnoses is higher than the number interviewed by the agency. It would be useful to discover whether those who did not "follow-through" were in no need of financial assistance or whether other causes prevented their applications.

Of special interest is the group of 178 who received case-work service only. This is a large number, amounting to one-fourth of the total load and almost a third as great as those who received financial assistance. This service was given to persons who were faced with making personal and family adjustments of many kinds including:

1. Families who needed help in placing children so that mothers could go to a sanatorium. With a dearth of child care facilities in the community added to the agency's own policy limitations, its case-

workers either found a relative's home, or referred families to agencies which could arrange temporary placement in an orphanage. Aside from the necessity of finding adequate homes for the children, the case workers dealt carefully with the occasionally expressed and sometimes concealed fear of mothers that their children's affections would turn toward the substitute mother.

2. Sanatoria patients from Bexar County, not previously known to the agency, who asked the case workers who were visiting other patients for help. They were worried about their families, their incomes, and particularly their children. Mothers worried about the possible loss of the child's affections.

3. Patients who suffered from a wide variety of marital problems—lack of mutual understanding, resentment, jealousy, incompatibility, infidelity, and all the other problems of marital discord aggravated by serious illness.

4. Patients who did not require financial aid from the agency but who needed help in budgeting and using their own resources so that they could remain independent.

In 1948, the financial assistance to families and individuals and the cost of providing case-work service to recipients and nonrecipients of aid, plus all administrative costs, amounted to $173,709.56. If the case-finding activities of the community were stepped up, present finances of the agency would be insufficient. But there is confidence that as the need is demonstrated by an influx of applications, the communities would be convinced that more funds must be provided. The Tuberculosis Control Board spends more money than any other social agency in the community except the State Department of Public Welfare and the local chapter of the American Red Cross. The former disburses the three assistance categories of Old Age Assistance, Aid to Dependent Children, and Aid to the Blind, while the latter serves a highly concentrated military area The budget standard used for computing allowances to patients and families is the highest in the community.

As we have already pointed out, this method of categorical assistance is not the only way, or necessarily the best way, to provide financial assistance to the tuberculous and their families In San Antonio it seemed wise to set up a special plan of assistance for the tuberculous rather than to aim toward a general assistance program for all the needy. It was felt that the community would understand the needs of the tuberculous more clearly and would provide more adequately for them. If the useful precedents, objectives, and standards which were established can be transferred without loss to a general public welfare department, and if improvements continue, the possible gains of such a move could add to the welfare of all. The needs and special problems of the tuberculous can be satisfied through a sufficiently broad program of public welfare, but the same

high standard of assistance must be maintained or the tuberculosis control program of San Antonio will be seriously impaired.

The City-County Tuberculosis Board, staffed by social workers, has, since November 1945, been alleviating some of the suffering experienced by these patients. The work of the City-County Tuberculosis Control Board cannot be done in a vacuum. It cannot achieve its maximum effectiveness unless the other phases of tuberculosis control are strengthened. The Board cannot and does not interfere with other agencies, but it does urge the development of those activities that must be improved if tuberculosis control in the community—and its own dovetailed part of it—is to advance. By conference, through letters, and in quarterly reports, it points out needs and problems. In some instances, its activities seem to have stimulated other phases of a control program.

Summary

This is what has happened, and is happening, in San Antonio. In 1944 and 1945 a public-spirited group of citizens and professional people, possessed of breadth of vision and understanding, successfully campaigned for the establishment of a new agency to meet the grave social problems faced by the tuberculous population. Spurred on by inadequacies in the local community resources, hoping to achieve a broad program of social and economic protection against tuberculosis, and building on sound basic concepts of public health and public welfare, they laid the foundations for a program of financial assistance designed to render aid and to help control tuberculosis.

Their hopes and their plans are slowly being translated into reality. Progress has been made in these 4 years. There has been constant improvement in the program and we are proud of our successes, but we are also keenly aware of our difficulties and our inadequacies. We know that we still have a long road ahead until we achieve our ultimate goal—a program of social and economic protection which will lift the tragic burden from the sick people of San Antonio and help rid our city of tuberculosis.

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Characteristics of Commercial X-ray Screens and Films—X

By Willard W. Van Allen, B. Sc.*

This is the tenth in a series of reports on the characteristics of commercial X-ray film-screen-developer combinations. The following tables represent the accumulated and revised findings of the Electronics Laboratory to date. An earlier report in this journal[1] described the technical details of this investigation.

Table 1. *Speed of fluoroscopic screen-film-developer combinations* [1] [2]

Films and developer	Development time [3] (min.)	Screens								
		D sample 1	D sample 2	D sample 3	666D sample 1	666D sample 2	E-2	B sample 1	B sample 2	B-2
Ansco Fluorapid:										
Ansco Liquadol	4	105	125	140	75	100	------	------	------	------
Buck X-ray	8	115	125	140	75	100	------	------	------	------
DuPont Liquid	5	115	120	130	75	95	------	------	------	------
Eastman Liquid	8	90	95	105	65	75	------	------	------	------
Eastman Rapid	8	135	145	165	85	110	------	------	------	------
Eastman X-ray	8	120	150	155	100	125	------	------	------	------
G. E. Supermix	8	155	170	200	100	130	------	------	------	------
DuPont Blue Fluorofilm No. 560 [4]: Dupont Liquid	5	------	------	------	------	------	------	------	------	------
DuPont Green Fluorofilm No. 562: DuPont Liquid	5	------	------	------	------	------	130	55	65	85
Eastman Blue Photoflure:										
Ansco Liquadol	4	85	105	115	65	85	------	------	------	------
Buck X-ray	8	140	150	175	90	115	------	------	------	------
DuPont Liquid	5	110	115	125	70	85	------	------	------	------
Eastman Liquid	8	160	165	195	100	130	------	------	------	------
Eastman Rapid	8	105	110	130	75	90	------	------	------	------
Eastman X-ray	8	95	115	130	75	100	------	------	------	------
G. E. Supermix	8	110	120	145	75	95	------	------	------	------
Eastman Green Photoflure:										
Ansco Liquadol	4	------	------	------	------	------	120	55	55	85
Buck X-ray	8	------	------	------	------	------	110	50	55	75
DuPont Liquid	5	------	------	------	------	------	120	50	60	85
Eastman Liquid	7	------	------	------	------	------	135	60	65	90
Eastman Rapid	7	------	------	------	------	------	115	50	55	80
Eastman X-ray	8	------	------	------	------	------	140	60	70	95
G. E. Supermix	8	------	------	------	------	------	155	75	75	110

[1] Speeds are determined with film and screen in direct contact and therefore do not represent the over-all speed of the same combinations when used in a photofluorograph.
[2] Subsequent reports will contain data on additional developers.
[3] As per directions on the label of the developer package. All development at 68° F.
[4] DuPont Blue Fluorofilm No. 560 is a new, improved film recently released by the manufacturer; it is not the same as the DuPont Fluorofilm listed in previous reports. All data given in previous reports for this film are therefore obsolete, and new data will be furnished later.

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[1] Pub. Health Rep. 64: 581 (1949). For a complete discussion of the sensitometry of X-ray materials, see The Sensitometry of Roentgenographic Films and Screens by Morgan and Van Allen, Radiology, June 1949.

Table 2. *Speed of intensifying screen-film-developer combinations* [1]

Films and developer	Development time [2] (min.)	Screens								
		Buck			Eastman			Patterson		
		Xtra speed	Mid speed	Definition	Ultra speed	Fine grain	Definition	High speed	Par speed	Detail
Ansco High Speed:										
Ansco Liquadol	3	70	60	50	110	85	60	115	60	20
Buck X-ray	3	65	50	45	100	75	50	100	55	20
DuPont Liquid	3	50	45	40	70	55	45	75	45	15
Eastman Liquid	3	50	45	40	85	60	45	85	45	15
Eastman Rapid	3	65	55	45	100	75	55	100	55	20
G. E. Supermix	3	75	60	50	110	85	60	115	65	20
DuPont No. 508: [3]										
Eastman Blue Brand:										
Ansco Liquadol	3	90	75	65	145	110	75	130	80	25
Buck X-ray	3	85	70	60	140	105	70	130	80	25
DuPont Liquid	3	80	70	60	130	100	70	115	70	25
Eastman Liquid	3	85	75	65	135	105	75	125	75	25
Eastman Rapid	3	75	65	55	120	90	65	105	60	25
Eastman X-ray	4½	85	70	60	140	110	80	120	90	25
G. E. Supermix	3	90	75	65	145	105	75	135	80	25

[1] Subsequent reports will contain data on additional developers.
[2] As per directions on the label of the developer package.
[3] DuPont No. 508, now on the market, is reported to be a new, improved product which is not the same as DuPont No. 508 listed in previous reports. All data in previous reports for this film are therefore obsolete, and new data will be furnished later.

Table 3. *Average value of fog and contrast (gamma)* [1]

Film	Fog densities—Developer [2]						
	Ansco Liquadol	Buck X-ray	DuPont Liquid	Eastman Liquid	Eastman Rapid	Eastman X-ray	G. E.-Supermix
Photofluorographic:							
Ansco Fluorapid	0.09	0.25	0.12	0.23	0.12	0.08	0.23
DuPont Blue Fluorofilm No. 560 [3]	------	------	.04	------	------	------	------
DuPont Green Fluorofilm No. 562	------	------	.10	------	------	------	------
Eastman Blue Photoflure	.04	.15	.08	.07	.05	.07	.09
Eastman Green Photoflure	.11	.26	.13	.15	.09	.10	.28
Roentgenographic:							
Ansco High Speed	.10	.07	.10	.11	.04	------	.10
DuPont No. 508 [4]	------	------	------	------	------	------	------
Eastman Blue Brand	.08	.07	.10	.08	.05	.06	.06

Film	Contrast (gamma)—Developer [2]						
	Ansco Liquadol	Buck X-ray	DuPont Liquid	Eastman Liquid	Eastman Rapid	Eastman X-ray	G. E. Supermix
Photofluorographic:							
Ansco Fluorapid	1.8	1.9	2.2	1.7	2.0	2.1	2.1
DuPont Blue Fluorofilm No. 560 [3]	------	------	1.9	------	------	------	------
DuPont Green Fluorofilm No. 562	------	------	2.2	------	------	------	------
Eastman Blue Photoflure	1.8	1.8	1.7	2.0	1.7	1.8	1.9
Eastman Green Photoflure	2.1	2.4	2.0	2.3	2.2	2.0	2.3
Roentgenographic:							
Ansco High Speed	2.8	2.3	2.1	2.6	2.3	------	2.8
DuPont No. 508 [4]	------	------	------	------	------	------	------
Eastman Blue Brand	3.0	2.9	2.7	3.0	3.2	2.8	------

[1] Values obtained with open-tank development and continuous mechanical agitation at 68° F. Values for fog densities obtained in open tank without agitation have been found generally lower.
[2] Development time as given in tables 1 and 2.
[3] See footnote 4, table 1.
[4] See footnote 3, table 2.

An Evaluation of the Histoplasmin Reaction in the Detection of Naturally Occurring Histoplasmosis in Dogs

By John A. Prior, M. D., Clarence R. Cole, D. V. M., Ph. D., and Virginia Torbet, M. S.*

In the search for the source of *Histoplasma capsulatum*, the fungus which causes histoplasmosis, many avenues have been explored. It is known that sensitivity to histoplasmin follows a definite geographic pattern of distribution, being highest in the midwestern part of the United States.

It is also known that animals, as well as human beings, are susceptible to histoplasmosis. In 1939, DeMonbreun (*1*) first reported a case of naturally occurring histoplasmosis in the dog and since that time 11 more cases (*2–10*) have been reported in the literature. Only in four of these was the diagnosis established by culture of the causative fungus. DeMonbreun demonstrated that the fungus recovered from dogs with histoplasmosis is identical, both morphologically and in its cultural characteristics, with the *H. capsulatum* found in man.

Since dogs live in closer association with man than any other domestic animal, some investigators have suggested the possibility that dogs may transmit the infection to man, and that fleas and ticks may act as carriers. Olson et al. (*11*) permitted ticks, *Dermacentor variabilis*, to feed on a dog proved by blood culture to be ill with histoplasmosis. *H. capsulatum* was recovered in pure culture from these ticks soon after feeding.

A list of the published reports of naturally occurring canine histoplasmosis is shown in table 1. It will be seen that a large proportion of the cases occurred in the midwestern United States, the area which is the endemic center of reported cases in man.

Emmons et al. (*12*) reported that histoplasmin is not specific for histoplasmosis since laboratory animals can be sensitized to it by experimental infection with other fungi, viz, *Blastomyces*, *Coccidioides* and *Haplosporangium*. These authors concluded, "The significance of the surprisingly high incidence of positive reactions to histoplasmin and blastomycin in man remains to be determined. We are not at present in a position to evaluate the clinical or epidemiological signi-

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Table 1. *Published reports of naturally occurring canine histoplasmosis*

Date	Author	Breed	Age	Sex	Habitat	Basis of diagnosis
1939	DeMonbreun, W. A. (*1*)	Boston Terrier	3 years	M	Tennessee	(1 2)
1944	Callahan, W. P., Jr. (*2*)	Springer Spaniel	7 years	F	Missouri	(1)
1945	Parsons, R. J. (*3*) and Everett, M. (*4*).	Beagle	(?)	F	Michigan	(1)
1945	Birge, R. F. and Riser, W. H. (*5*).	Pekinese	4 years	M	Iowa	(1)
		Boston Terrier	5 years	M		(1)
1945	Tomlinson, W. J. and Grocott, R. G. (*6*).	Springer Spaniel	6 years	F	Canal Zone	(1)
1946	Pará, M. (*7*)	Mongrel	(?)	(?)	Brazil	(1 2)
1946	Seibold, H. R. (*8*)	Pitt Bull Terrier	2½ years	M	Virginia	(1)
			18 months	F		(2)
1947	Emmons, C. W., Bell, J. A., and Olson, B. J. (*9*).	Pitt Bull Terrier	18 months	M	Virginia	(2)
1948	Harmon, K. S. (*10*)	Fox Terrier	14 months	M	Missouri	(1)
			25 months	M		(1)

[1] Microscopic demonstration of organisms in the tissues.
[2] Culture of *Histoplasma capsulatum*.

ficance of these positive reactions in view of the demonstrated cross reactions between these antigens." On the other hand, Howell (*13*) has shown that by the selection of appropriate antigen concentrations the degree of cross reaction is small in experimentally infected guinea pigs.

In the many thousands of histoplasmin tests applied to man in this country, very few have actually detected active histoplasmosis, confirmed by culture of *H. capsulatum* or microscopic demonstration of the causative fungi in the tissues. For this reason many doubt the diagnostic value of the histoplasmin skin test.

In order to evaluate the utility of histoplasmin tests on dogs, we have recently tested 837 dogs in the Veterinary Clinic, Ohio State University, College of Veterinary Medicine, Columbus, Ohio. These dogs were all routine admissions to the clinic, and no selection was made by age, sex, breed, or disease condition.

The dogs were tested with histoplasmin supplied by Dr. Arden Howell of the Public Health Service. H–15 was used in a dilution of 1:1000, and when the supply of H–15 was exhausted, H–42 was substituted. A 1:100 dilution of H–42 corresponds in antigenicity to the 1:1000 dilution of H–15. The histoplasmin was injected intracutaneously in the almost hair-free medial aspect of the flank skin fold. The test was interpreted after 48 hours, and edema 5 mm. or more in diameter was considered a positive reaction.

Of the 837 dogs tested, 643 were given a single test with the 1:1000 dilution of H–15. Two were reactors. The first, a 4-year-old male Scottish terrier from Columbus, Ohio, had edema and erythema 5 mm. in diameter. This animal was suffering from a chronic progressive illness and died 2 months after the test was applied. However, no further studies were possible. The other, a 2-year-old female

fox terrier, also from Columbus, had a reaction 19 mm. in diameter with erythema and marked necrosis.

The remaining 194 animals received the 1:100 dilution of H–42. Of this group 69 were also given simultaneous injections of 1:10 dilutions of H–42. Three dogs reacted to both dilutions. One, a 2½-year-old male springer spaniel from Columbus, showed a 7 mm. reaction to both. A 2½-year-old male border collie, also of Columbus, had a reaction of 10 mm. to both. A one-year-old female English sheep dog from Washington Court House, Ohio, reacted to the larger dose in a very marked manner with 25 mm. of edema, marked surrounding erythema, central necrosis and subsequent sloughing. This animal reacted to the 1:100 dilution with 16 mm. of edema.

Biopsy of spleen, liver and mesenteric nodes was made for culture and histopathologic study from three of the five dogs that were histoplasmin reactors. Two of the three were proved to have histoplasmosis by recovery of *H. capsulatum* in pure culture. *H. capsulatum* was recovered from the liver of one (positive to H–42) and the spleen of the other (positive to H–15). Biopsy tissues from all three showed organisms characteristic of *H. capsulatum* and other histopathologic findings consistent with a diagnosis of histoplasmosis. These three animals all suffered from chronic respiratory infections of a similar nature and all three showed the presence of many partially calcified nodular lesions in the lungs. All were tuberculin negative. A summary of these findings appears in table 2.

Not included in the tests described above was a boxer puppy with acute histoplasmosis which was tested with histoplasmin (H–15 in both 1:100 and 1:1000 dilutions) on two occasions 15 days apart, but failed to react. The diagnosis was established *ante mortem* by culture of *H. capsulatum* from the blood. Cultures taken post mortem from blood, liver, spleen, lung, ascitic fluid and lymph nodes also yielded *H. capsulatum* in pure culture. It has been a frequent ob-

Table 2. *Summary of data pertaining to dogs reacting to histoplasmin*

Breed	Histoplasmin			Basis of diagnosis	Present state of animal
	Lot	Dilution	Reaction[1]		
Scottish terrier	H–15	1:1000	5 mm.	No further studies possible.	Died after 2 months with chronic progressive illness.
Fox terrier	H–15	1:1000	19 mm.	(2 3)	Expired; necropsy revealed extensive histoplasmosis.
Springer spaniel	H–42	1:100	7 mm.	(3)	Apparently recovered.
Border collie	H–42	1:100	10 mm.	Negative findings	Still living.
English sheep dog	H–42	1:100	25 mm.	(2 3)	Apparently recovered.

[1] Skin reaction in millimeter of edema.
[2] Microscopic demonstration of organisms in the tissues.
[3] Culture of *Histoplasma capsulatum*.

servation that patients acutely ill or dying of histoplasmosis fail to react to histoplasmin.

Discussion

One of the writers (Prior, *14*) has investigated the histoplasmin reactivity of human beings in Ohio. A study of Ohio State University freshmen showed that 62.9 percent of the students from central Ohio were reactors to histoplasmin. Of the 2,391 reactors to histoplasmin, no cases of active histoplasmosis were found, although several were studied in University Hospital, Columbus, Ohio, in an attempt to detect active disease.

In direct contrast to the above work, our study of 837 dogs from the same area revealed only 5 that reacted to the histoplasmin skin test. It is highly significant that three of five animals subsequently were proved to have active histoplasmosis by culture of *H. capsulatum* and demonstration of the causative organisms in the characteristic microscopic lesions. No other fungi or other pathogenic agents were cultured or observed in tissue sections from these cases of naturally occurring histoplasmosis

Olson et al. (*11*) states, "The histoplasmin skin test is not specific for histoplasmosis in animals and no evidence has been found that the reaction is specific for histoplasmosis in humans." It should be noted that Olson's conclusions are based upon application of the histoplasmin test to guinea pigs, rabbits and man. However, according to our results it appears that the test is more useful as a diagnostic aid when applied to dogs than to the species mentioned above.

Summary

1. 837 dogs were tested with histoplasmin and only 5 reacted (0.59 percent).

2. Of five dogs reacting to histoplasmin, three were proved to have active naturally occurring histoplasmosis. All failed to react to tuberculin. Attempts to demonstrate pathogenic agents other than *H. capsulatum* were unsuccessful.

3. It appears that the histoplasmin skin test is more useful in the detection of naturally occurring active histoplasmosis in dogs than it is in other species.

4. One dog, terminally ill with acute histoplasmosis, diagnosed by blood culture and confirmed at autopsy by recovery of a pure culture of *H. capsulatum* from liver, spleen, lymph nodes, lung and ascitic fluid, failed to react to histoplasmin on two occasions.

ACKNOWLEDGMENT

The authors wish to acknowledge the services of Dr. Samuel Saslaw and Dr. Margaret Heise for mycologic studies, the cooperation of J. H. Knapp, D. V. M., who made possible the study of one case of histoplasmosis, and the assistance of Loren Kintner.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 12, 1949

The incidence of poliomyelitis in the United States has declined continuously since the week of August 20 (the highest week) in which 3,417 cases were reported. There were 751 cases of poliomyelitis reported this week as compared with 881 last week. Decreases may be noted in 31 States and the District of Columbia, the largest being in New York (from 126 to 94), Texas (from 52 to 29), New Jersey (53 to 35), and Missouri (from 25 to 8). An aggregate increase of 78 cases was reported in 14 States with increases of 22 and 15 in South Dakota (from 1 to 23) and Mississippi (from 2 to 17), respectively. In the geographic areas, decreases were reported for all except the West North Central and the East South Central, which reported increases of 3 (from 108 to 111) and 26 (from 28 to 54), respectively.

The total number of poliomyelitis cases in the Nation to date is 39,792. The five leading States are New York (5,292), Illinois (2,795), Michigan (2,692), California (2,300), and Texas (2,204). The four States and the District of Columbia having the lowest total reported this year are Nevada (16), Delaware (43), Montana (93), South Carolina (101), and the District of Columbia (104).

No unusual incidence was reported for the diseases as shown in the following table. All the communicable diseases are below the 5-year (1944–48) median, except that of poliomyelitis. During the week, one case of leprosy was reported in the District of Columbia, one case of psittacosis in California, and one case of smallpox in Kansas. Two States reported cases of Rocky Mountain spotted fever, one each in North Carolina and Oklahoma.

Of 29 States reporting on rabies in animals, 16 reported no cases, while the remaining 13 reported a total of 111. The States reporting the largest numbers were Texas (33) and New York (16). Indiana reported 20 cases for a 2-week period ending with the current week.

A total of 8,433 deaths was recorded during the week in 93 large cities in the United States, as compared with 9,109 last week; 8,534 and 9,336, respectively, for the corresponding weeks of 1948 and 1947; and 8,711 for the 3-year median. For the year to date the total is 409,556, as compared with 411,273 for the same period last year. Infant deaths for the current week totaled 622; the corresponding week last year, 621; and the 3-year median, 719. The cumulative figure is 29,278 as compared with 29,894 for the same period last year.

Telegraphic case reports from State health officers for the week ended November 12, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	...	...	...	18	...	3	6	...	2	...	...	...	11	...
New Hampshire	...	...	...	...	1	2	1	...	4	...	...	...	4	...
Vermont	...	...	...	1	...	...	2	...	4	...	...	...	23	...
Massachusetts	3	1	...	21	...	...	25	...	36	...	...	...	94	...
Rhode Island	...	...	...	...	...	7	1	...	...	...	...	...	12	...
Connecticut	...	...	...	11	3	19	14	...	7	...	...	1	85	...
MIDDLE ATLANTIC														
New York	8	...	[2] 2	14	5	144	94	...	[3] 52	...	...	2	188	16
New Jersey	1	...	1	34	1	46	35	...	19	...	...	2	126	...
Pennsylvania	5	...	...	46	6	63	26	...	38	...	...	1	169	3
EAST NORTH CENTRAL														
Ohio	9	...	3	20	4	41	21	...	108	...	...	1	98	10
Indiana	10	...	3	27	...	3	24	...	26	...	...	1	21	20
Illinois	...	1	1	14	3	54	46	...	39	...	...	2	95	...
Michigan [4]	1	1	...	91	3	15	63	...	38	...	...	...	122	...
Wisconsin	...	...	4	30	1	7	8	...	32	...	...	...	84	...
WEST NORTH CENTRAL														
Minnesota	5	1	...	14	1	16	23	...	27	...	...	...	6	...
Iowa	...	...	...	20	...	...	24	...	4	...	...	...	3	...
Missouri	2	...	...	3	3	2	11	...	4	...	1	2	11	...
North Dakota	...	...	1	5	...	...	3	...	6	...	...	...	...	...
South Dakota	5	...	...	23	1	2	23	...	[3] 6	...	...	...	...	...
Nebraska	...	...	3	7	...	1	18	...	4	...	...	...	10	...
Kansas	1	1	...	4	...	9	9	...	13	1	1	...	13	...
SOUTH ATLANTIC														
Delaware	...	...	...	7	...	...	...	...	1	...	...	1	4	...
Maryland [4]	3	...	...	9	1	20	16	...	17	...	...	1	43	...
District of Columbia	1	...	...	15	...	6	2	...	3	...	...	...	4	...
Virginia	9	...	133	13	...	35	8	...	25	...	1	3	19	4
West Virginia	6	...	28	11	2	5	5	...	15	...	...	1	1	...
North Carolina	25	...	...	26	...	...	1	1	82	...	...	...	26	...
South Carolina	33	...	6	3	1	11	1	...	9	...	...	1	7	1
Georgia	21	...	8	7	...	10	8	...	36	...	...	...	4	7
Florida	4	1	2	...	...	7	5	...	4	...	...	...	...	...

EAST SOUTH CENTRAL														
Kentucky	8	-	-	10	2	6	20	-	39	-	-	3	1	6
Tennessee	9	1	16	3	2	41	14	-	66	-	1	2	21	-
Alabama	7	-	9	1	-	21	3	-	20	-	-	1	3	6
Mississippi [4]	17	-	9	12	-	40	17	-	15	-	-	-	3	-
WEST SOUTH CENTRAL														
Arkansas	8	-	46	1	2	29	8	-	13	-	2	1	14	-
Louisiana	4	-	1	-	-	24	4	-	5	-	-	1	1	1
Oklahoma	7	-	43	3	2	24	15	1	13	-	-	1	4	1
Texas	18	1	1,175	27	4	216	29	-	16	-	1	2	59	33
MOUNTAIN														
Montana	-	1	-	45	-	-	2	-	5	-	-	-	-	-
Idaho	-	-	15	5	-	4	4	-	[3] 11	-	-	-	2	-
Wyoming	-	-	-	1	-	5	4	-	27	-	1	-	4	-
Colorado	-	-	28	-	-	9	6	-	5	-	-	1	3	3
New Mexico	-	-	-	17	-	6	1	-	9	-	-	5	3	-
Arizona	1	-	107	18	-	12	5	-	4	-	-	-	4	-
Utah [4]	-	-	-	43	-	3	8	-	3	-	-	-	9	-
Nevada	-	-	-	-	-	-	1	-	-	-	-	-	3	-
PACIFIC														
Washington	-	-	3	52	-	-	11	-	13	-	-	-	9	-
Oregon	3	-	7	10	1	15	10	-	13	-	-	-	14	-
California	7	-	4	35	1	18	66	-	72	-	-	4	64	-
Total	241	9	1,658	777	50	1,001	751	2	1,010	1	8	40	1,504	-
Median, 1944-48	405	12	1,834	1,544	58	-	330	3	1,584	2	11	74	1,863	-
Year to date 45 weeks	6,684	687	89,988	594,572	2,967	67,115	[5] 39,792	553	65,990	45	979	3,313	55,259	-
Median, 1944-48	11,217	574	204,658	565,154	5,192	-	18,202	512	99,257	304	813	3,678	85,663	-
Seasonal low week ends	(27th) July 9	-	(30th) July 30	(35th) Sept. 3	(37th) Sept. 17	-	(11th) Mar. 19	-	(32d) Aug. 13	(35th) Sept. 3	-	(11th) Mar. 19	(30th) Oct. 1	-
Since seasonal low week	2,916	-	14,121	6,054	451	-	[5] 38,876	-	7,730	4	-	2,853	8,657	-
Median, 1944-45 to 1948-49 [6]	5,045	-	14,916	8,562	526	-	17,939	-	12,962	31	-	3,203	9,738	-

[1] Including paratyphoid fever currently reported separately as follows: New York 1, Ohio 1, Virginia 2, California 3. Cases reported as salmonella infection not included in the table, were as follows: New York 4, Pennsylvania 1.

[2] New York City only.

[3] Including cases reported as streptococcal infection and septic sore throat.

[4] Period ended earlier than Saturday.

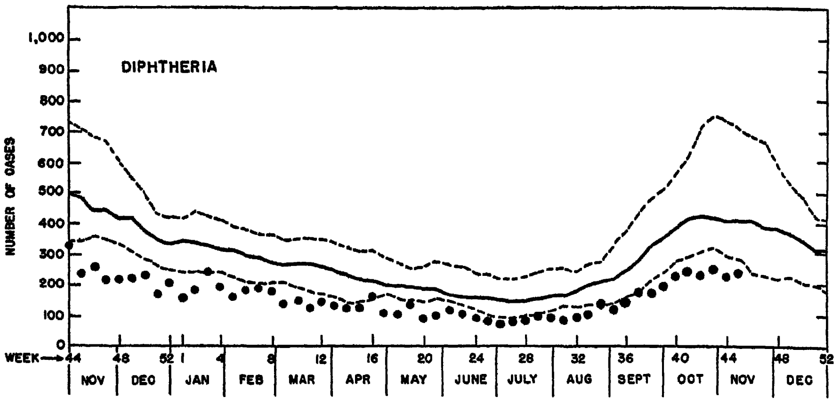
[5] *Deductions:* Poliomyelitis—Michigan, weeks ended August 20 and October 22, 1 case each; North Carolina, week ended October 15, 1 case; Wyoming, week ended October 1, 1 case.

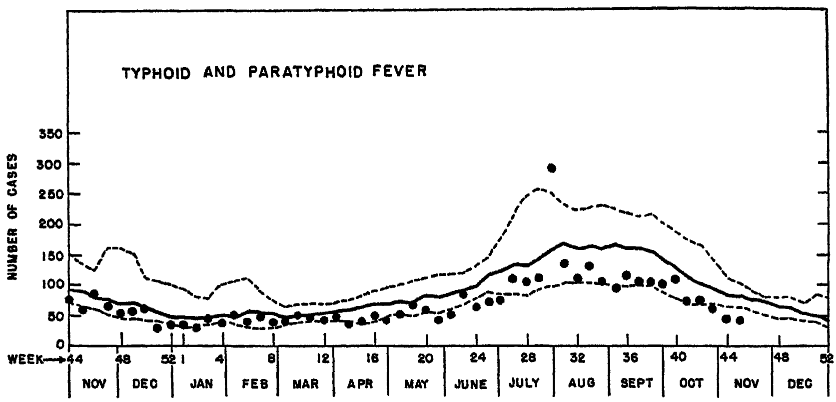
[6] The median of the 5 preceding corresponding periods (1944-45 to 1948-49).

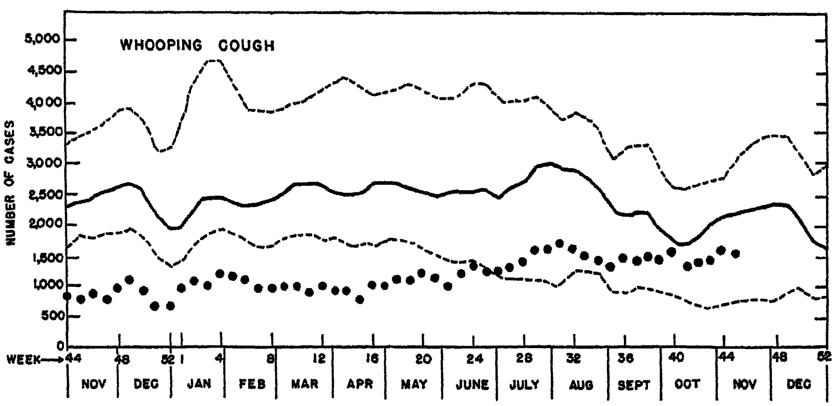
Leprosy: District of Columbia 1 case.
Psittacosis: California 1 case.
Alaska: Measles 5.
Hawaii Territory: Report not received.

Communicable Disease Charts

All reporting States, November 1948 through November 12, 1949







The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is the median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1949.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended October 29, 1949.—During the week ended October 29, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			11		140	141	29	30	67	153	571
Diphtheria					4	8			3	1	16
Dysentery, bacillary						2					2
Encephalitis, infectious						2					2
German measles			3		4	14			22	10	53
Influenza			14			4	1	1			20
Measles			27		82	50	56	146	49	308	718
Meningitis, meningococcal						2				1	3
Mumps			53		79	126	2	2	22	179	463
Poliomyelitis				3	5	4	2	2	3		19
Scarlet fever	7		2	1	43	33	7	2	21	18	134
Tuberculosis (all forms)			4	19	123	19	17	4	72	31	289
Typhoid and paratyphoid fever					3	3			2	9	17
Undulant fever					6	1	3				10
Venereal diseases:											
Gonorrhea	5		19	9	81	66	43	17	39	95	374
Syphilis	6		8	6	52	23	2	13	6	18	134
Other forms										2	2
Whooping cough	1		4		41	21	2		14	16	99

FINLAND

Notifiable diseases—September 1949.—During the month of September 1949, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	7	Poliomyelitis	52
Diphtheria	106	Scarlet fever	290
Dysentery	2	Syphilis	65
Gonorrhea	872	Typhoid fever	29
Paratyphoid fever	153		

MADAGASCAR

Notifiable diseases—August and September 1949.—Notifiable diseases were reported in Madagascar and Comoro Islands during August and September 1949 as follows:

Disease	August 1949			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi			1	
Bilharziasis			64	
Cerebrospinal meningitis			11	4
Diphtheria	2		2	
Dysentery:				
Amebic	4		230	
Bacillary			11	
Erysipelas	17	2		
Influenza	49		4,593	56
Leprosy			28	
Malaria	267	3	35,270	212
Measles			128	2
Mumps	4		146	
Plague			4	4
Pneumonia, broncho			659	71
Pneumonia, pneumococcic			595	69
Puerperal infection			5	
Relapsing fever			1	
Tuberculosis, pulmonary	9		122	19
Trachoma	1			
Typhoid fever			4	
Whooping cough	12		396	7

Disease	September 1949			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi			2	
Bilharziasis			153	1
Cerebrospinal meningitis			7	4
Diphtheria	1			
Dysentery:				
Amebic	4		251	3
Bacillary	1			
Erysipelas			14	1
Influenza	56		3,964	41
Leprosy			30	1
Malaria	300	2	29,743	173
Measles			108	1
Mumps	1		117	
Plague			17	17
Pneumonia, broncho	1		302	56
Pneumonia, pneumococcic	1		423	54
Poliomyelitis			1	
Puerperal infection			7	2
Relapsing fever	1			
Tuberculosis, pulmonary	7	1	97	23
Trachoma	1		2	
Typhoid fever	3		12	1
Whooping cough	2		397	18

NEW ZEALAND

Notifiable diseases—5 weeks ended October 1, 1949.—During the 5 weeks ended October 1, 1949, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Actinomycosis	1		Malaria	2	
Cerebrospinal meningitis	13	1	Ophthalmia neonatorum	1	
Diphtheria	18		Poliomyelitis	12	
Dysentery:			Puerperal fever	4	
Amebic	4		Scarlet fever	134	
Bacillary	6		Tetanus	4	3
Encephalitis, lethargic	1		Trachoma	1	
Erysipelas	13		Tuberculosis (all forms)	179	58
Food poisoning	12		Typhoid fever	17	1
Influenza	8	5	Undulant fever	9	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Brazil.—Plague has been reported in Brazil as follows: During the month of May 1949, 8 cases with 2 deaths, in Ceara State, 1 case in Pernambuco State; during the month of June 1949, 1 case in Ceara State.

Madagascar.—During the period October 11–20, 1949, 10 fatal cases of plague were reported in Fianarantsoa Province, Madagascar.

Netherlands Indies—Java—Jogjakarta.—During the week ended October 8, 1949, 35 cases of plague, all fatal, were reported in Jogjakarta Residency, Java. Plague has also been reported in Jogjakarta City as follows: Week ended October 22, 8 cases; week ended October 29, 6 cases.

Peru.—During the month of May 1949, plague was reported in Peru as follows: Lima Department, Huacho Province, 3 cases, 1 death; Piura Department, Huancabamba Province, 3 cases.

Smallpox

Argentina.—During the period June 1–30, 1949, 86 cases of smallpox (alastrim) were reported in Argentina, including 36 cases in Buenos Aires Province and 19 cases in Chubut Territory.

French Equatorial Africa.—During the month of August 1949, 102 cases of smallpox, with 23 deaths, were reported in French Equatorial Africa.

Mexico—Mexico City.—For the week ended October 22, 1949, 7 cases of smallpox were reported in Mexico City, Mexico.

Syria—Aleppo and Hama.—During the week ended October 15,

1949, 8 cases of smallpox were reported in Aleppo, Syria, and 19 cases were reported in Hama.

Typhus Fever

Mexico.—During the period October 2–22, 1949, 9 cases of typhus fever were reported in Mexico City, Mexico, and during the period October 9–22, 7 cases were reported in the city of Monterrey.

Poland.—During the period September 4–October 1, 1949, 36 cases of typhus fever were reported in Poland.

DEATHS DURING WEEK ENDED NOV. 12, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Nov. 12, 1949	Corresponding week, 1948
Data for 93 large cities of the United States:		
Total deaths	8, 433	8, 534
Median for 3 prior years	8, 711	
Total deaths, first 45 weeks of year	409, 556	411, 273
Deaths under 1 year of age	622	621
Median for 3 prior years	719	
Deaths under 1 year of age, first 45 weeks of year	29, 278	29, 894
Data from industrial insurance companies:		
Policies in force	70, 056, 330	70, 814, 473
Number of death claims	7, 798	10, 618
Death claims per 1,000 policies in force, annual rate	5. 8	7. 8
Death claims per 1,000 policies, first 45 weeks of year, annual rate	9. 1	9. 3

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

VOLUME 64 **DECEMBER 9, 1949** NUMBER 49

IN THIS ISSUE

Average Poliomyelitis Incidence
Poliomyelitis Epidemic Recurrence

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Division of Public Health Methods
G. St. J. Perrott, Chief of Division

CONTENTS

Page

Average poliomyelitis incidence reported in the counties of the United States, 1932–46. Alexander G. Gilliam, Fay M. Hemphill and Jean H. Gerende ---- 1575

Poliomyelitis epidemic recurrence in the counties of the United States, 1932–46. Alexander G. Gilliam, Fay M. Hemphill and Jean H. Gerende ---- 1584

INCIDENCE OF DISEASE

United States:
- Reports from States for week ended November 19, 1949 ---- 1596
- Deaths during week ended November 19, 1949 ---- 1599
- Territories and possessions:
  - Hawaii Territory—
    - Plague (human) ---- 1599
    - Plague (rodent) ---- 1599
  - Panama Canal Zone—Notifiable diseases—September 1949 ---- 1599
  - Virgin Islands—Notifiable diseases—July–September 1949 ---- 1600

Foreign reports:
- Canada—Provinces—Notifiable diseases—Week ended November 5, 1949 ---- 1600
- Cuba—
  - Habana—Notifiable diseases—5 weeks ended October 1, 1949 ---- 1601
  - Provinces—Notifiable diseases—5 weeks ended October 1, 1949 ---- 1601
- Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—
  - Plague ---- 1601
  - Smallpox ---- 1602
  - Typhus fever ---- 1602
  - Yellow fever ---- 1602

Public Health Reports

Vol. 64 • DECEMBER 9, 1949 • *No. 49*

Average Poliomyelitis Incidence Reported in the Counties of the United States, 1932–1946

By ALEXANDER G. GILLIAM, FAY M. HEMPHILL and JEAN H. GERENDE*

The tendency in the United States for epidemics of poliomyelitis to be distributed irregularly both geographically and in time was noted by Frost in 1913 (*1*). Lavinder, Freeman and Frost (*2*) also observed that up to 1916 both endemic and epidemic poliomyelitis had been more frequently reported in northern than in southern portions of this country. Predilection of the disease for irregular distribution in time and in place has been documented further by Dauer's studies of the county distribution of reported cases for the individual years 1933 through 1948 (*3*). In examination of his annual maps he has noted that areas of high incidence vary in extent and location and that there is generally an interval of several years between periods of high incidence in any one locality. The latter fact had been observed in this country by Lavinder, Freeman and Frost (*2*) on the basis of a more limited experience and prior to that time by Wernstedt (*4*) in Sweden as well as others (*5*).[1]

It is not possible from Dauer's published data to determine whether the observed annual regional differences in incidence persist or whether they tend to disappear over a period of years. Nor from these, or other published data, can one subject to any quantitative test the impression that an interval of several years elapses between periods of high incidence in any one locality. It is therefore proposed to examine

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Collection of basic data was instituted while the senior author was on detail to the Office of Malaria Control in War Areas (now the Communicable Disease Center). Their analysis was initiated while he was on detail to the Department of Epidemiology, the University of Michigan School of Public Health. Work undertaken at the latter institution was aided by a grant from the National Foundation for Infantile Paralysis.

[1] This phenomenon had been noted earlier by Lovett and Richardson (*6*) on the basis of experience in Massachusetts, but these authors postulated a 2-year periodicity which subsequent experience has not confirmed. The most adequate early documentation of the "sparing effect" of an epidemic of poliomyelitis—in the present-day sense—appears to be that of Wernstedt (*4*).

the distribution by county of poliomyelitis reported to the Public Health Service during the years 1932 to 1946, inclusive, with these general questions in mind. This report deals with average reported incidence for the entire 15-year period and a subsequent report will examine the same data from the standpoint of annual incidence and epidemic recurrence.

Sources of Data

Since 1932 the various State Departments of Health have submitted to the Division of Public Health Methods, Public Health Service, the number of cases reported monthly from the counties of their jurisdiction.[2] At the end of the year such records are corrected for duplication, changed diagnoses, etc., and annual totals for the State (not the individual counties) are published in The Notifiable Diseases, a supplement to PUBLIC HEALTH REPORTS. The available information does not allow some cases to be allocated to county of report, hence the monthly totals do not in all instances exactly equal the final total credited to the State in The Notifiable Diseases.

Data in this study are drawn from summation of these monthly reports by counties. Where annual totals so derived for all counties differed materially from State totals as published, additional data were provided by the State Health Department concerned. Where the difference was slight, monthly reports as originally received were used. Thus, during the 15-year period in question the distribution of 142,744 reported cases by county and year of occurrence is available. This differs little from the 143,565 cases recorded for the same period in The Notifiable Diseases. It means, essentially, that 821 cases, or 0.58 percent of the total in this study, were not susceptible to allocation to county of report.

It appears necessary to emphasize that in most States in this country no distinction is made between paralytic and nonparalytic poliomyelitis in cases officially reported. There is thus no relatively objective criterion for comparing reported incidence in two localities at one time or even in the same locality at different times. Although personal experience (Gilliam) suggests that the true ratio of paralytic to nonparalytic disease varies with epidemics, the situation is not infrequently encountered where suspected abortive and nonparalytic disease is reported officially in one county and only paralytic disease registered in an adjoining political jurisdiction patently involved in the same epidemic. In addition, though poliomyelitis is probably better recorded in this country than many other communicable diseases, completeness of reporting varies considerably from time to

[2] In some States certain incorporated cities are politically independent of the counties to which they are geographically contiguous. For purposes of State morbidity reports, and in this study, they are regarded as counties.

time and from place to place (*7*, *8*). These limitations must be recognized in any analysis of reported poliomyelitis. It must be emphasized, therefore, that this study deals with poliomyelitis *reported* in the counties of the United States for a 15-year period, 1932–46.

Results

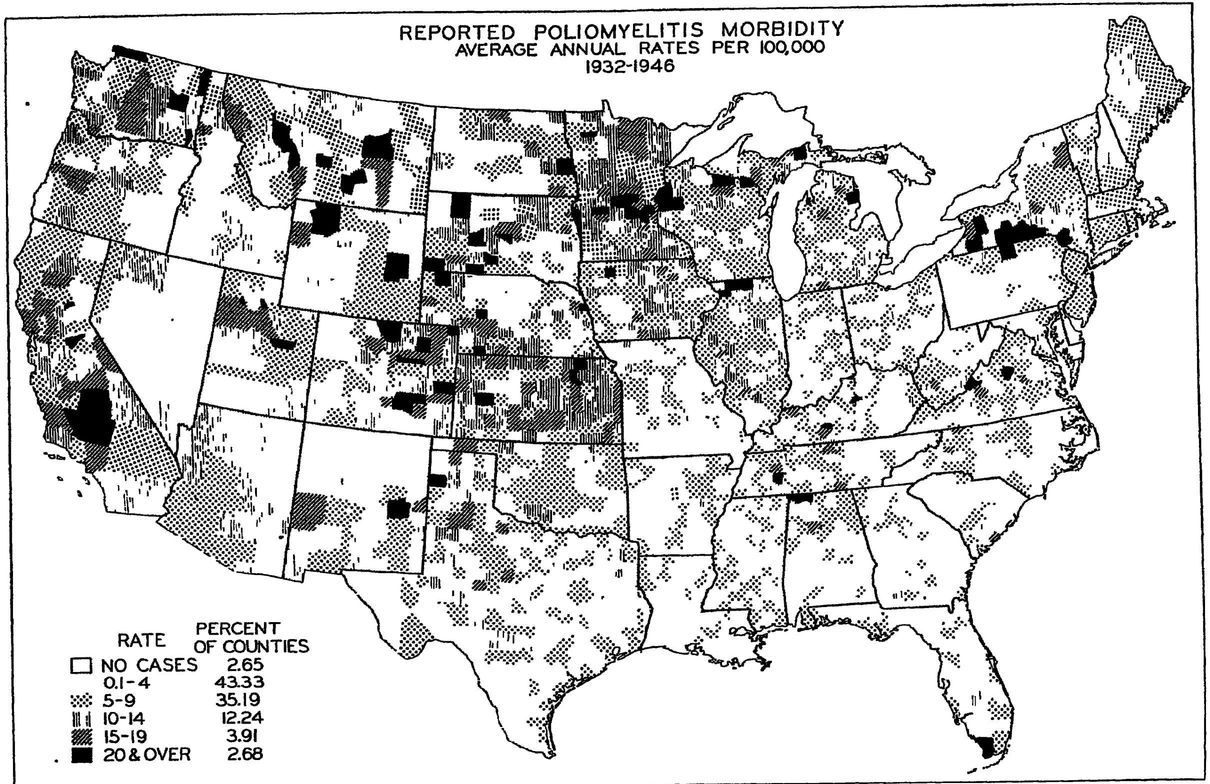
The map illustrates the average annual case rate per 100,000 population calculated from cases reported in the counties of the United States for the 15-year period 1932 to 1946, inclusive. It is seen that no cases were reported in this period in 2.65 percent (82) of the counties. These counties are irregularly distributed with no tendency towards grouping and show no predilection for geographic sections. Their distribution appears to be associated with population of the counties, since all 82 were counties with less than 25,000 people; 71 with less than 10,000; and 50 with less than 5,000.

It is further noted that in 2.68 percent (83) of the counties, rates of 20 or more cases per 100,000 population were recorded. These counties are similarly distributed irregularly except that a tendency towards grouping is noted in three areas and these high rates are for the most part limited to the northern counties.[3] Thus, only 7 of the 83 counties with high rates are southern. That chance also plays a role in the high average annual rates in some counties is evident from the fact that in 54 the estimated population in 1939 was less than 25,000 However, in five counties with high rates the population was estimated to be greater than 100,000. These counties are: Kern and Tulare, California; Winnebago, Illinois; Hennepin, Minnesota; and Broome, New York. In all of them, except Tulare County, the high average annual rate was largely contributed to by one epidemic of more than 100 cases per 100,000 population and in one county, Kern, this high rate was exceeded in 3 of the 15 years.

From examination of the map it would appear that the southern States not only are deficient in counties reporting high average annual rates but that the average reported incidence is lower in this section in the period under study. This visual impression is borne out in subsequent analyses both on the basis of frequency distributions of rates and total rates.

Frequency distributions of county rates are shown in table 1 for the standard geographic divisions of the United States and for northern

[3] Here and elsewhere in this report northern counties are considered as those counties lying north of a line forming the southern boundaries of Virginia, Kentucky, Missouri, Kansas, Colorado, Utah, and Nevada and continued westward through the counties of California, the majority of whose area lies above or below it. This line has been selected largely for convenience but certain analyses, in addition to those recorded here, suggest that with some exceptions it represents a fairly good dividing point insofar as reported poliomyelitis is concerned. As is readily evident from the map, an important exception is in the State of California.



Average annual poliomyelitis morbidity, per 100,000 population, reported in the counties of the United States during the 15-year period, 1932–46, inclusive.

Table 1. *Percentage distribution of counties in each geographic division by average annual poliomyelitis morbidity rates, 1932–46, inclusive*

Geographic division	Percentage of counties in each rate group						
	Average annual rate per 100,000 population						
	0	0.1–4	5–9	10–14	15–19	20 and over	Total
New England	1.49	13.43	68.66	16.42	0	0	100
Middle Atlantic	0	36.30	38.36	14.38	2.74	8.22	100
East North Central	0	33.72	50.00	11.93	1.60	2.75	100
West North Central	1.45	33.01	31.88	21.42	8.37	3.87	100
South Atlantic	5.18	60.28	28.32	4.49	1.04	.69	100
East South Central	0	56.87	34.34	5.77	1.92	1.10	100
West South Central	3.83	55.32	33.19	5.75	1.70	.21	100
Mountain	7.89	30.47	28.67	20.07	6.81	6.09	100
Pacific	1.50	19.55	34.59	24.06	13.53	6.77	100
Northern counties	2.52	33.57	38.71	16.17	5.13	3.90	100
Southern counties	2.88	59.89	29.21	5.58	1.83	.61	100
United States	2.65	43.33	35.19	12.24	3.91	2.68	100

and southern counties as previously defined. More than 60 percent of the southern counties recorded rates of less than 5 per 100,000 while about 35 percent of the northern counties fell into this rate class. Further, in only 8 percent of southern counties were rates of 10 or more reported, while about 25 percent of northern counties recorded average rates of this magnitude.

Individual geographic divisions lying largely or wholly in the northern or southern sections differ little from the larger sections of which they are a part in distribution of county rates. The Mountain and Pacific divisions, however, contain a substantial number of counties classed as southern, and both divisions follow a northern type of rate distribution. It is worthy of note that in the Pacific division the counties of southern California contribute materially to the northern type of rate distribution.

In table 2 the northern and southern counties are distributed in several population groups and total cases and average annual rates are recorded. The estimated mid-year (1939) population was less than 10,000 in 25 percent of the 1,948 counties classed as northern and in 20 percent of the 1,147 counties classed as southern. These northern counties comprised about 3 percent of the total northern population and reported about the same percentage of cases. In the southern section they comprised about 4 percent of the population and accounted for slightly less than 3 percent of the southern cases.

The heavily populated northern counties of 100,000 or more people comprised only 7 percent of the county units but included about 57 percent of the northern population and accounted for a like percentage of the cases. On the other hand counties of this size made

Table 2. *Distribution of northern and southern counties in several population groups, by total number of cases reported 1932–46 and average annual rates per 100,000 population*

Population group [1]	Counties		1939 population		Cases 1932–46		Average Annual rate
	Number	Percent	Number	Percent	Number	Percent	
Northern counties							
0–9,000	492	25.26	2,940,102	3.11	3,415	3.17	7.74
10,000–24,000	769	39.47	12,598,249	13.33	14,228	13.20	7.53
25,000–49,000	382	19.61	13,062,656	13.82	15,625	14.50	7.97
50,000–99,000	170	8.73	12,088,694	12.79	13,629	12.65	7.52
100,000–499,000	112	5.75	24,127,892	25.53	27,784	25.78	7.68
500,000 and over	23	1.18	29,696,379	31.42	33,088	30.70	7.43
Total	1,948	100.00	94,513,972	100.00	107,769	100.00	7.60
Southern counties							
0–9,000	225	19.62	1,407,014	3.86	954	2.73	4.52
10,000–24,000	494	43 07	8,288,218	22.72	5,913	16.90	4.76
25,000–49,000	300	26.15	10,072,031	27.60	7,219	20.64	4.78
50,000–99,000	83	7.24	5,360,472	14.69	4,329	12.38	5.38
100,000–499,000	43	3.75	8,101,825	22.20	9,356	26.75	[2] 7.70
500,000 and over	2	.17	3,258,596	8.93	7,204	20.60	[2] 14.74
Total	1,147	100.00	36,488,156	100.00	34,975	100.00	[2] 6.39
United States							
0–9,000	717	23.17	4,347,116	3.32	4,369	3.06	6.70
10,000–24,000	1,263	40.81	20,886,467	15.94	20,141	14.11	6.43
25,000–49,000	682	22.04	23,134,687	17.66	22,844	16.00	6.58
50,000–99,000	253	8.17	17,449,166	13.32	17,958	12.58	6.86
100,000–499,000	155	5.01	32,229,717	24.60	37,140	26.02	7.68
500,000 and over	25	.80	32,954,975	25.16	40,292	28.23	8.15
Total	3,095	100.00	131,002,128	100.00	142,744	100.00	7.26

[1] Counties are grouped according to their mid-year (1939) estimated population. Because of increases or decreases in population all counties did not actually remain in the same population group throughout the 15-year period.
[2] Southern counties, excluding southern California: 100,000–499,000—6.1; 500,000 and over—8.3; total—5.2.

up only 4 percent of the southern reporting units with 31 percent of its population and 47 percent of its cases.

Thus, the southern counties are slightly deficient in units of less than 10,000 population and more greatly deficient in heavily populated counties. These relative deficiencies are compensated for by a relative excess in reporting units of 25,000 to 49,000 population. In addition, the more populous southern units recorded a disproportionately high percentage of southern cases.

For the country as a whole more than two-thirds of the cases in this 15-year period were reported from counties of 50,000 or more population, which made up only 14 percent of the total counties. Although this might be expected, it seems deserving of emphasis in any consideration of a visual representation of geographic distribution of disease, such as is illustrated in the map.

Average annual rates for northern and southern counties are shown in table 2 for counties divided into six population groups. In the northern counties there is no discernible difference in rates among the six population groups shown. Among southern counties, however, there is a fairly definite increase in rates in the three classes with 50,000 or more population. These differences remain even when the populous

counties of southern California are excluded. For the country as a whole, the same tendency is noticed for the counties with populations of 50,000 or more.

Studies in this country and elsewhere have stated that in general the risk of clinical attack decreases as population density increases. Both northern and southern experience noted here would appear to be at variance with this thesis, since in the northern counties average risk appeared uniform in all population groups and in the southern counties average risk increased with population. It should be pointed out, however, that most studies in this country dealing with risk of attack as related to density of population were made during the period when official reports included few nonparalytic cases, that is, when the incidence in one area could be more fairly compared with reported incidence in another than is possible now. Further, data recorded here probably reflect population density too inadequately to comprise a fair test of this particular point. One would expect, a priori, that the proportion of nonparalytic cases reported would increase with size of population in the reporting unit. Any effort to explain why this might occur more frequently in the south than in the north would be pure speculation. It will be recalled, however, that the initial impetus in this country towards recording nonparalytic disease was first manifest in the New England, and some of the Middle Atlantic States in the late 1920's.

The total rate recorded for all northern counties is significantly greater than the rate for all southern counties. Whether or not this represents a difference in actual incidence or a difference in reporting is again a matter of speculation. The data of Collins (*8*), comprising a canvass for past history of paralytic disease in samples of northern and southern populations, support the impression that the northern section may have actually experienced a greater incidence than the southern. During this period, however, the States classed here as southern reported a numerically, but not significantly, higher crude death rate from poliomyelitis than the northern States. (0.82 per 100,000 versus 0.73 per 100,000).

In table 3 the percentages of counties of different population groups falling into several average annual rate classes are shown for northern and southern counties. Units in both sections reporting no cases in 15 years are limited to the less populous counties. Among the northern counties about 43 percent of those with less than 10,000 population reported rates of less than 5 while only 13 percent of the most populous counties recorded such rates. There is thus, with increase in population, a decrease in percentage of counties in the under 5 rate group, while an opposite tendency is apparent in the 5–9 group. For the whole northern experience, the largest proportion of counties fell in the 5–9 rate group.

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Table 3. *Percentage distribution of northern and southern counties in several population and average annual rate groups*

Population group [1]	Average annual case rates per 100,000 population						Total percent
	0	0.1–4	5–9	10–14	15–19	20 and over	
Northern counties							
0–9,000	8.94	34.55	29.07	16 67	5.69	5 08	100
10,000–24,000	.65	35.89	38.10	16.05	5.46	3 25	100
25,000–49,000	-------	30.37	44.50	15.97	4.97	4.19	100
50,000–99,000	-------	35.29	44.12	12.35	4.12	4.12	100
100,000–499,000	-------	25.89	50.89	18.75	2.68	1.79	100
500,000 and over	-------	13.04	69.56	8.70	4.35	4.35	100
Total	2 52	33.57	38.71	16.17	5.13	3.90	100
Southern counties							
0–9,000	12 00	53.78	22.22	8.00	3.11	.89	100
10,000–24,000	1.21	62.55	28.95	5.67	1.21	.41	100
25,000–49,000	-------	65 34	29.67	3.33	1.33	.33	100
50,000–99,000	-------	55.42	38.55	4.82	1.21	-------	100
100,000–499,000	-------	34.89	46.51	9.30	4.65	4.65	100
500,000 and over	-------	-------	50.00	-------	50.00	-------	100
Total	2 88	59.89	29.21	5.58	1.83	.61	100
United States							
0–9,000	9,90	40.58	26.92	13.95	4.88	3.77	100
10,000–24,000	.87	46.32	34.52	12 35	3.80	2.14	100
25,000–49,000	-------	45.75	37.98	10.41	3.37	2.49	100
50,000–99,000	-------	41.90	42.29	9 88	3.16	2.77	100
100,000–499,000	-------	28 39	49.68	16.13	3.22	2.58	100
500,000 and over	-------	12.00	68.00	8.00	8.00	4.00	100
Total	2.65	43.33	35.19	12.24	3.91	2.68	100

[1] See footnote 1, table 2.

Among southern counties the same relationships are noted except that in the total experience the greatest proportion of counties fell into the under 5 rate group instead of the 5–9 class.

The tendency in both sections for the percentage of counties in the rate group 10–14 to decrease with increase in population is not regular, since in the north the highest percentage is found in the 100,000 to 499,000 population class and in the south the percentages increase in the counties with 50,000 or more population. In the two classes representing rates of 15 or more per 100,000 no regular relationship to population of county is apparent. In addition, the number of counties falling in these rate classes is small.

For the country as a whole it may be said that units reporting no cases are limited to the counties with small populations. On the other hand, higher rates were reported in about the same proportion of these counties as in counties with greater population. Among the rate groups considered, the mode appears in the under 5 rate class for counties under 50,000 population and in the 5–9 rate class for counties with more than 50,000.

Summary

The average annual rates calculated from cases of poliomyelitis reported in the counties of the United States during 15 years, 1932–46,

have been grouped in 6 rate classes and mapped. When this map is divided into northern and southern sections by the parallel representing a general westerly continuation of the southern border of Virginia, it is observed that:

1. Of the small proportion (2.68 percent) of counties reporting the highest rates, most lie in the northern section with little other tendency towards geographic concentration evident.

2. No tendency towards grouping nor sectional predilection is manifest by the counties (2.65 percent) in which no cases were recorded.

3. Higher average annual rates appeared to prevail in the northern section.

Further analysis of these rates confirmed the impression, gained from review of the map, that the rates reported from the northern counties were higher in the period under review. It cannot be determined from these data, however, whether the reported differences between northern and southern sections are due to differences in actual incidence of manifest disease, to differences in reporting, or to other factors, such as variation in age and racial distribution of populations.

Analysis of counties in several population groups showed that the southern section was slightly deficient in lightly populated and more greatly deficient in heavily populated counties. For the whole United States counties of 50,000 population or more comprised only about 14 percent of all counties, included about 63 percent of the population and accounted for over two-thirds of all cases. Among the northern counties little difference was observed between rates for the different population groups. In southern counties, however, while the average rates were about the same among the groups under 50,000 population, a striking rate increase was observed with population increase in the 3 classes comprising those of 50,000 and over.

For the country as a whole the units reporting no cases were limited to the lightly populated counties. Among the rate groups examined, the mode appears in the under 5 per 100,000 class for counties under 50,000 population and in the 5–9 class for more populous counties.

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Poliomyelitis Epidemic Recurrence in the Counties of the United States, 1932–1946

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In the preceding report (*1*) certain analyses were made of the cases of poliomyelitis reported in the counties of the United States for the 15-year period 1932 through 1946. That study was largely concerned with average annual rates recorded. This report deals with the same basic data from the point of view of testing the observation made by Wernstedt (*2*), that areas passing through epidemics of poliomyelitis experience several years of relative freedom before epidemic recurrence. It was noted that others have called attention to this phenomenon but that no quantitative test of the impression was possible from published literature.

Sources of Data

The data discussed represent the cases reported, by county of origin, by the various State Health Departments to the Public Health Service. The detailed sources of these data, together with some comment on their limitations, have been described previously (*1*). In this

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Collection of basic data was instituted while the senior author was on detail to the Office of Malaria Control in War Areas, (now the Communicable Disease Center). Their analysis was initiated while he was on detail to the Department of Epidemiology, the University of Michigan School of Public Health. Work undertaken at the latter institution was aided by a grant from the National Foundation for Infantile Paralysis.

study, annual rates for the years 1932 through 1939 are based on annual county population estimates as of July 1, obtained by arithmetic interpolation of the 1930 and 1940 censuses. Population estimates for the remaining years were made by arithmetic extrapolation of the same census figures.

Because of the large population dislocations which occurred just preceding and during the war years, some objection may be made to this method of population estimates. In areas such as southern California, for example, calculated rates are too high since the population estimates are undeniably low. Such objections are valid but are outweighed by the necessity, in the analyses to follow, for annual estimates made on a consistent basis. It is believed that while the rates here reported are badly distorted for some areas and in some years, this distortion is insufficient to seriously disturb the general observations made.

Frequency Distribution of Annual Rates

In the preceding report (*1*) it was noted that in counties classed as southern [1] the average annual incidence of reported poliomyelitis was less than in northern counties during the period under study. In addition, the frequency distributions of these rates were different in the two sections.

To test these differences further, annual rates have been calculated for each of the 3,095 counties, or a total of 46,425 county rates in the 15-year period. The distribution of these rates for northern and southern counties is shown in table 1. It is readily evident that the differences noted in average annual rates in the two sections are also apparent when annual rates are assembled. Thus, each of 1,948 northern counties was at risk of reporting no cases as well as 1 or more cases annually 15 times during this period; or for all northern counties there were 29,220 epidemic opportunities. In 16,250 of such instances (55.61 percent) no cases were reported. This is in contrast to southern experience where no cases were recorded in 62.43 percent of instances. On the other end of the rate scale, incidence of 100 or more per 100,000 was reported in 0.92 percent in northern experience and in only 0.28 percent among southern counties.

Viewed in terms of epidemic opportunities table 1 represents county rates actually reported during a 15-year period. The entire distribution of these rates expresses the average annual risk northern and southern counties experienced. It may therefore be said that each percentage listed in table 1 represents the average annual risk each county experienced of reporting each rate noted. For example, based

[1] Counties classed as southern are those lying south of the parallel representing a general westerly continuation of the southern border of Virginia.

on cases reported from 1932 to 1946, a northern county annually had about 56 chances in 100 of reporting no cases at all and less than 1 chance in 100 of recording a severe epidemic of 100 or more cases per 100,000.

Table 1. *Frequency distribution of annual rates for reported poliomyelitis in northern and southern counties during the 15-year period, 1932–46*

Annual rate per 100,000 population	Number and percent of counties experiencing each annual rate			
	Northern counties		Southern counties	
	Number	Percent	Number	Percent
No cases	16,250	55 61	10,741	62.43
0.1–4	4,051	13.86	2,260	13.14
5–9	3,331	11.40	1,795	10.43
10–14	1,705	5 84	856	4.98
15–19	997	3 41	465	2.70
20–24	590	2 02	288	1.67
25–29	476	1.63	171	.99
30–34	319	1 09	172	1.00
35–39	238	.82	88	.51
40–49	343	1.17	131	.76
50–74	456	1.56	135	.78
75–99	195	.67	56	.33
100–149	156	.53	37	.22
150–199	62	.21	4	.02
200 and over	51	.18	6	.04
Total	29,220	100 00	17,205	100 00

Definition of an Epidemic

Table 1 also provides a basis for defining an epidemic in terms of recorded experience. An epidemic is generally regarded as an unusual and temporary increase in the prevalence of a particular disease in a specified population. Unusual increase implies a rate that is uncommonly noted. With poliomyelitis it is not satisfactory to consider as epidemic a rate exceeding average incidence since the average rate frequently is composed largely of a few unusual episodes. Thus, in over half of the epidemic opportunities of this experience no cases at all were recorded.

What may be regarded in a statistical sense as unusual is a matter of opinion; there are degrees of "unusualness." It is general practice, however, to consider as uncommon an event occurring not oftener than about 5 times in 100 opportunities. Accumulation of percentages in table 1 shows that rates of less than 35 per 100,000 population were reported in about 95 percent (94.86) of northern experience and rates of less than 25 per 100,000 were recorded in a similar (95.35) proportion of southern epidemic opportunities. Thus, in northern counties a rate of 35 or more, and in southern counties a rate of 25 or more per 100,000, was registered in about 5 out of 100 epidemic opportunities.

On the basis, therefore, of rates noted in poliomyelitis reported for the counties of the United States during a 15-year period, an epidemic

will be considered as an annual rate of 35 or more per 100,000 among northern counties and 25 or more per 100,000 for southern counties. It is not intended to imply that this definition satisfies all requirements needed in a general definition of an epidemic of poliomyelitis but it does reflect actual reported experience.

It is further not intended to imply that the definitions of an epidemic derived from these data are necessarily of general application in the United States. Differences in reported poliomyelitis in the 15 years, 1932 to 1946, between the counties classed as northern and southern required the adoption of different epidemic standards in the two sections for that period. These standards are based on observed experience and are subject to revision as further experience accumulates.

Attention has been focused on the increasing tendency since the late 1930's toward the occurrence of epidemics of poliomyelitis in the southern States. If this tendency towards increase, either in actual incidence or in reporting, has been generally greater in the southern than in the northern States then a different epidemic standard in the two sections has already lost any general significance. Therefore, it must be reiterated that the definitions here presented apply to poliomyelitis reported in the 15 years, 1932 to 1946, and are applicable only to counties and not to reporting units as large as States.

In focusing attention on the increase reported in the southern States, a similar increase in northern States has been generally overlooked. A comparison of the two sections on the basis of changes in average annual rates, in two 11-year periods, is given in the table below and shows that the increase in reported poliomyelitis has been similar in both sections. This is also observed in table 6 where the 15 years, 1932–46, are divided in five 3-year periods.

Ratio $\frac{\textit{Average annual rate 1938–48}}{\textit{Average annual rate 1927–37}}$	*Southern States*	*Northern States**
Less than 1.0	0	5
1.0–1.9	6	15
2.0–2.9	3	8
3.0–3.9	3	4
4.0–4.9	0	1
5.0–5.9	1	1
6.0–6.9	0	1
Total	13	35
California=1.23 (omitted above)		

*Including the District of Columbia.

The five northern States reporting decreases experienced epidemics in 1931 or 1935, or in both years.

In table 2 rate groups are further divided in "degree of epidemicity" and average annual risk for each class is given for northern and southern counties in several population groups. Rates of 100 or more per 100,000 are arbitrarily regarded as "severely epidemic" in both

Table 2. *Average annual risk, of poliomyelitis epidemics of different severity, experienced during the 15-year period, 1932–46, by northern and southern counties in several population groups*

Epidemic severity	Annual rate per 100,000	Probability of epidemic						
		Population of county						All counties
		Under 10,000	10–24,000	25–49,000	50–99,000	100–499,000	500,000 and over	
Northern counties								
Severely epidemic	100 and over	0.0143	0.0085	0.0073	0.0060	0.0035	0.0060	0.0092
Epidemic	35 and over	.0646	.0496	.0472	.0408	.0412	.0243	.0514
Mildly epidemic	20 to 34	.0460	.0457	.0481	.0460	.0592	.0763	.0474
Endemic	0.1 to 19	.0882	.2846	.4923	.6590	.8079	.8872	.3451
No cases	0	.8012	.6201	.4124	.2542	.0917	.0122	.5561
Total county epidemic opportunities, 1932–46.		7,416	11,531	5,720	2,502	1,723	328	29,220
Average annual epidemic opportunities.[1]		492	769	382	170	112	23	1,948
Southern counties								
Severely epidemic	100 and over	.0050	.0023	.0013	.0016	.0081	.0000	.0028
Epidemic	25 and over	.0587	.0429	.0396	.0395	.0808	.1428	.0465
Mildly epidemic	15 to 24	.0437	.0441	.0406	.0437	.0599	.1071	.0437
Endemic	0.1 to 14	.0554	.2390	.4057	.5791	.7557	.7501	.2855
No cases	0	.8420	.6840	.5141	.3377	.1036	.0000	.6243
Total county epidemic opportunities, 1932–46.		3,430	7,377	4,538	1,214	618	28	17,205
Average annual epidemic opportunities.[1]		225	494	300	83	43	2	1,147

[1] These figures equal the number of counties in each population group in the mid-year, 1939. If some counties did not lose or gain population sufficiently to change from group to group, then the "total epidemic opportunities" in each class would be 15 times each average annual figure.

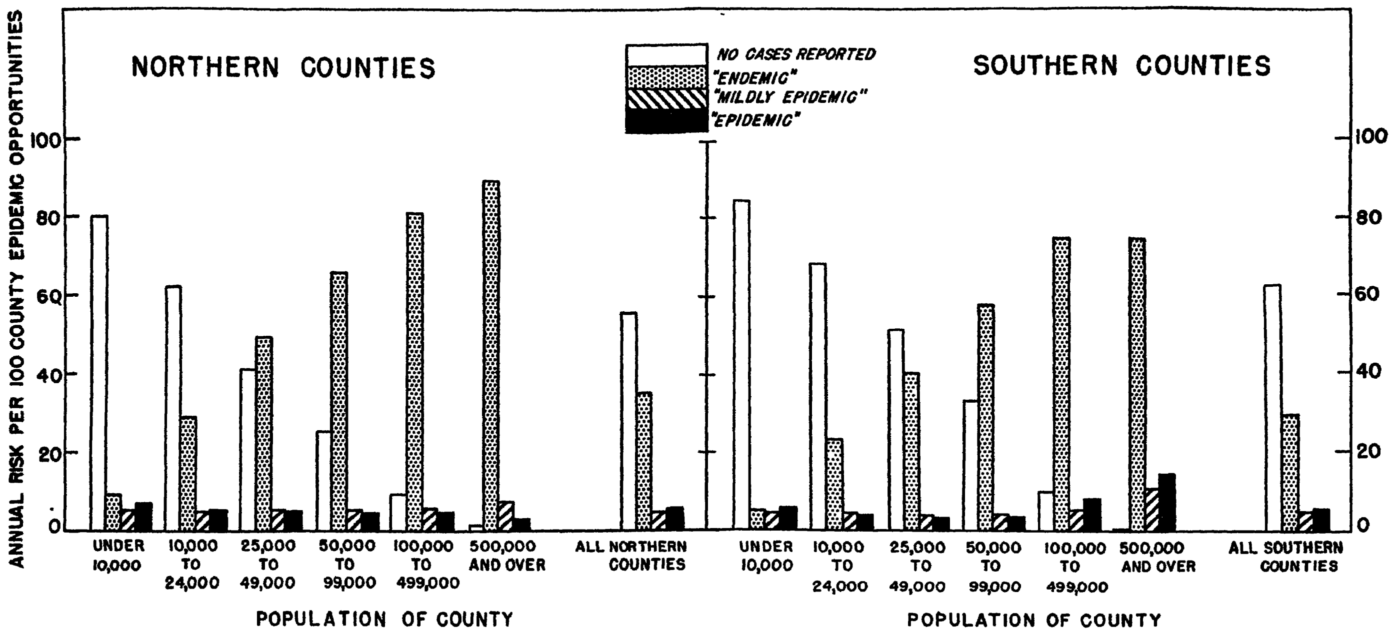
sections. The rate group next lower than that classed as "epidemic," and experienced about 5 times in 100 "epidemic opportunities," is called "mildly epidemic". For northern counties this comprises rates of 20 to 34 per 100,000 and for southern counties rates of 15 to 24 per 100,000. All rates below these groups are arbitrarily called "endemic".

It is noted in table 2 that in each population group probabilities recorded are based on a substantial sample of epidemic opportunities except in the instance of counties with populations of 500,000 or more. There were 328 such opportunities among northern counties and only 28 among southern counties. Probabilities for southern counties in this population class therefore have little stability. It should be pointed out also that chance may, and undoubtedly does, play a large role in rates experienced in lightly populated counties. Thus, in a southern county of 10,000 people, 3 cases make an epidemic and in both sections 10 cases, in a population of that size, constitute a severe epidemic. The standard error of a rate of 30 per 100,000 in a population of 10,000 is ± 17.3. Thus, one might expect from 0 to about 6 cases by chance alone, although by definition the latter is an epidemic.

In spite of these facts table 2 demonstrates a number of points of

Table 3. *Percentage distribution of counties, by annual poliomyelitis rates per 100,000 population, for each year, 1932 to 1946, inclusive*

Rate per 100,000	Percent of counties experiencing each rate, each year															
	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1932–46
Northern counties																
0	66.79	64.07	59.19	60.78	65.04	47.38	76.08	63.40	40.09	55.60	62.78	53.03	43.28	49.44	27.26	55.61
0.1–4	15.55	14.43	16.12	13.86	15.66	13.04	14.37	15.50	12.52	14.68	17.76	14.06	8.88	11.96	9.55	13.86
5–9	9.80	10.16	10.32	10.27	10.06	16.12	5.44	9.91	11.40	15.09	10.01	11.24	15.66	14.68	10.83	11.40
10–14	4.16	4.72	4.31	5.19	3.39	9.75	2.41	3.70	7.70	6.57	3.95	5.85	9.70	8.01	8.11	5.84
15–19	1.39	2.62	2.77	3.18	2.00	5.24	.67	2.36	5.29	2.93	2.05	4.06	6.47	4.42	5.75	3.41
20–24	.67	1.18	1.85	1.44	.92	2.46	.26	1.18	4.52	1.80	.67	2.21	3.39	2.36	5.39	2.02
25–29	.62	1.08	1.03	.92	1.13	1.44	.10	.92	4.06	1.28	.72	1.74	2.77	2.11	4.52	1.63
30–34	.31	.36	.62	.92	.46	1.39	.21	.46	2.72	.46	.26	1.74	1.90	1.18	3.39	1.09
35–39	.10	.20	.56	.51	.36	.87	0	.72	1.90	.36	.31	.98	1.23	1.23	2.87	.82
40–99	.51	1.08	2.36	2.47	.82	2.05	.46	1.49	8.26	1.18	1.28	3.80	5.39	3.95	15.91	3.40
100–199	.10	.10	.67	.36	.16	.21	0	.26	1.28	0	.16	1.03	1.02	.56	5.29	.74
200 and over	0	0	.20	.10	0	.05	0	.10	.26	.05	.05	.26	.31	.10	1.13	.18
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
35 and over	.71	1.38	3.79	3.44	1.34	3.18	.46	2.57	11.70	1.59	1.80	6.07	7.95	5.84	25.20	5.14
100 and over	.10	.10	.87	.46	.16	.26	0	.36	1.54	.05	.21	1.29	1.33	.66	6.42	.92
Southern counties																
0	80.11	81.78	76.63	70.53	61.55	49.08	72.54	63.13	68.27	47.69	62.52	59.97	55.10	49.62	37.93	62.43
0.1–4	10.81	9.68	10.29	11.07	14.65	13.43	14.82	13.16	14.38	14.73	16.65	11.60	15.78	14.21	11.77	13.14
5–9	5.58	5.14	6.54	8.81	10.46	13.08	8.02	9.24	10.81	13.34	11.94	7.93	15.34	16.30	13.95	10.43
10–14	1.92	1.74	2.09	3.40	4.88	6.62	2.79	4.45	3.49	7.24	4.36	5.06	6.02	8.37	12.21	4.98
15–19	.87	.70	1.05	2.27	2.79	5.67	1.22	3.14	1.48	4.18	1.83	2.88	2.88	4.18	5.40	2.70
20–24	.44	.35	.87	1.05	1.31	2.88	.26	1.83	.35	3.23	.70	2.27	1.39	2.44	5.75	1.67
25–29	0	.17	.17	.52	1.05	2.00	.09	1.13	.17	1.66	.44	2.27	.78	1.23	3.23	.99
30–34	.09	.26	.44	.44	.78	1.57	.17	1.31	.35	1.83	.52	2.35	.87	1.13	2.88	1.00
35–39	.09	.09	0	.17	.35	1.39	.09	.52	.35	.96	.26	.96	.44	.17	1.83	.51
40–99	.09	.09	1.57	1.57	1.74	3.75	0	1.65	.35	4.53	.78	4.18	.96	2.09	4.71	1.87
100–199	0	0	.35	.17	.44	.44	0	.44	0	.52	0	.44	.44	.17	.17	.24
200 and over	0	0	0	0	0	.09	0	0	0	.09	0	.09	0	.09	.17	.04
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100 00	100.00	100.00	100.00	100.00	100.00	100.00
25 and over	.27	.61	2.53	2.87	4.36	9.24	.35	5.05	1.22	9.59	2.00	10.29	3.49	4.88	12.99	4.65
100 and over	0	0	.35	.17	.44	.53	0	.44	0	.61	0	.53	.44	.26	.34	.28



Average annual risk of reported poliomyelitis in northern and southern counties of several population groups during the 15-year period, 1932 to 1946, inclusive.

interest. When counties are considered without regard to population, it is observed that in the period 1932 to 1946 a severe epidemic was about 3 times as likely to be reported in a northern county as in a southern county. Since by arbitrary definition "epidemic" and "mildly epidemic" were chosen to comprise about 10 percent of total risk, the remaining probabilities are distributed in the "endemic" and "no cases" classes. In these, northern experience shows a higher risk for "endemicity" and southern experience shows a higher risk for reporting no cases.

Risk related to population of county is also shown in table 2 and is illustrated graphically in the chart. Among northern counties epidemic risk is relatively great (0.0646) in counties with less than 10,000 population and decreases regularly as population increases. Thus, though the total risk in 15 years has been shown to be similar for northern counties in all these population classes (*1*), the annual risk is inversely related to size of population. Among southern counties annual epidemic risk is similar to northern experience only in counties of less than 100,000. Both annual and total risk increase in the two other population classes.

The two sections show the same general difference in risk of reporting no cases and for recording rates regarded as endemic; such differences that exist are differences in degree rather than of kind.

Frequency distributions of rates for northern and southern counties recorded for each year, 1932 to 1946, are presented in table 3. Considerable annual variation is observed around the mean experience presented in table 1. Thus, while the average epidemic risk was 0.0514 for northern counties, this probability varied from 0.0046 to 0.2520 during the 15 years. Similarly, the risk of a severe epidemic varied from 0.0000 to 0.0642 around the mean probability of 0.0092. Comparable annual variability is observed among the southern counties.

Observed and Expected Epidemic Recurrence

Table 4 shows the frequency distribution of epidemics, as previously defined, reported in 15 years in northern and southern sections. It is seen that 1,051 of the 1,948 northern counties reported epidemics once or oftener in 15 years for a total of 1,501 epidemics. Of these, 702 counties recorded one epidemic, 267 two epidemics and so on up to one county reporting epidemic rates 6 times in 15 years. A similar compilation is shown for the southern counties.

If the average annual probability for an epidemic is equal to p, then the chance occurrence of multiple epidemics in 15 years may be calculated[2] by expansion of the point binomial $(p+q)^{15}$. These

[2] We are indebted to Dr. Harold Dorn and Jerome Cornfield of the National Cancer Institute for suggesting this method of computing chance recurrence of epidemics.

Table 4. *Observed and expected epidemic recurrence during the 15-year period, 1932–46*

Number of epidemics	Number of counties having epidemics			
	Northern		Southern	
	Observed	Expected [1]	Observed	Expected [1]
0	897	883	590	562
1	702	717	380	411
2	267	272	129	140
3	66	64	38	30
4	14	10	6	4
5	1	1	2	----------
6	1	1	1	----------
7	----------	----------	0	----------
8	----------	----------	1	----------
Number of counties	1,948		1,147	
Counties having 1 or more epidemics in 15 years	1,051		557	
County epidemics	1,501		800	
Epidemic opportunities	29,220		17,205	
Average annual epidemic probability, p	.0514		.0465	
	P=>0.50		P=<0.01	

[1] Expected epidemic distribution $= (p+q)^{15}$.

calculations, for northern and southern counties are also given in table 4. It is readily apparent from this table that, among northern counties, the observed occurrence of two or more epidemics in the 15-year period is not significantly different from that calculated on the assumption that recurrence is due to chance. Among southern counties, however, observed recurrence is significantly greater than expected.

It has been pointed out previously that, by the epidemic definitions employed here, very few cases constitute an epidemic in a lightly populated county. In such counties, therefore, epidemic recurrence may be due to chance variability in rates alone. The counties were therefore divided into two groups, those with populations in 1939 of 50,000 or over and those with less. Observed and expected epidemic recurrence were then tabulated for each group. The results of these tabulations are not shown, but there was no difference in either section between expected and observed recurrence in counties of 50,000 or more population. The excess recurrence noted for southern counties in table 4 is limited to counties of less than 50,000 population, and therefore loses practical significance because of chance variability of annual rates in such counties.

It has never been suggested, however, that epidemic recurrence during a period of 15 years is an uncommon event. The data therefore have been reassembled, and observed and expected epidemic frequency and recurrence tabulated in table 5 for three 5-year periods. Among northern counties there is no significant difference between observed recurrence and that expected by chance. Among southern counties, however, observed recurrence is significantly less than that expected through chance in the period 1937–41, and greater (and of

Table 5. *Observed and expected epidemic recurrence in three 5-year periods, 1932–46*

Number of epidemics	Number of counties having epidemics					
	1932–36		1937–41		1942–46	
	Observed	Expected[1]	Observed	Expected[1]	Observed	Expected[1]
Northern counties						
0	1,752	1,748	1,591	1,596	1,195	1,191
1	184	191	335	324	611	616
2	12	8	21	26	125	127
3	----------	----------	1	1	16	13
4	----------	----------	----------	----------	1	1
5	----------	----------	----------	----------	----------	----------
Number of epidemics	208		380		913	
Epidemic opportunities	9,740		9,740		9,740	
Average annual epidemic probability, p	.0214		.0390		.0937	
	P=>0.10		P=>0.20		P=>0.80	
Southern counties						
0	1,035	1,030	869	883	827	810
1	105	112	266	237	264	292
2	5	5	11	25	46	42
3	2	----------	----------	1	10	3
4	----------	----------	1	----------	----------	----------
5	----------	----------	----------	----------	----------	----------
Number of epidemics	122		292		386	
Epidemic opportunities	5,735		5,735		5,735	
Average annual epidemic probability, p	.0213		.0509		.0673	
	P=>0.20		P=<0.001		P=>0.01	

[1] Expected epidemic distribution $=(p+q)^5$.

borderline significance) than expected in the period 1942–46. When the three 5-year periods are combined, however, no significant difference is found between observed and expected recurrence in either section (north, P=0.99; south, P=>0.70).

Separate tabulations, not recorded here, show that the peculiarities observed in table 5 for the two periods, 1937–41 and 1942–46, in the southern counties are limited to the counties with less than 50,000 population. Such differences therefore would appear to lack any practical significance because of chance variability in annual rates in counties of less than 50,000.

In table 6 the data have been reassembled into five 3-year periods and observed and expected epidemic frequency tabulated for each section. It is observed in each section that in four of the five periods observed recurrence is numerically less than expected by chance. However, in only two individual periods (north, 1944–46 and south 1941–43) is this difference statistically significant. When the five periods are combined, however, observed recurrence is significantly (P=<0.01) less than expected for each section.

It therefore would appear that epidemic recurrence within 15 years and within 5 years is not significantly different from that expected by chance but is significantly less frequent within a 3-year period.

Table 7 shows the intervals observed between epidemics in north-

Table 6. *Observed and expected epidemic recurrence during five 3-year periods, 1932–46*

Number epidemics	1932–1934 Observed	1932–1934 Expected [1]	1935–1937 Observed	1935–1937 Expected [1]	1938–1940 Observed	1938–1940 Expected [1]	1941–1943 Observed	1941–1943 Expected [1]	1944–1946 Observed	1944–1946 Expected [1]
Northern counties										
0	1,837	1,835	1,796	1,797	1,669	1,675	1,766	1,770	1,266	1,283
1	107	111	149	147	271	259	180	173	612	575
2	4	2	3	4	8	13	2	6	62	86
3									8	4
County epidemics	115		155		287		184		760	
Epidemic opportunities	5,841		5,844		5,841		5,844		5,844	
Average annual epidemic probability, p	.0197 P=>0 10		.0265 P=>0 50		.0491 P=>0.10		.0315 P=>0.05		.1300 P=<0 01	
Southern counties										
0	1,109	1,109	965	968	1,073	1,073	902	914	917	919
1	37	38	175	169	73	73	239	216	216	211
2	1		7	10		2	6	17	13	16
3					1				1	
County epidemics	39		189		76		251		245	
Epidemic opportunities	3,441		3,441		3,441		3,441		3,441	
Average annual epidemic probability, p	.0113 P=>0 80		0549 P=>0 20		0221 P=>0 30		.0729 P=<0.01		.0712 P=>0 50	

[1] Expected epidemic distribution = $(p+q)^3$.

ern and southern counties reporting more than one epidemic in the 15 years under review. In 114 instances (83 northern and 31 southern) epidemics occurred in successive years while in one instance there were 13 years between epidemics. There would appear to be no particular pattern in distribution of yearly intervals between epidemics, though in about 50 percent the period was shorter than 4 years.

Table 7. *Years intervening between epidemics*

Years intervening	Northern counties Number	Northern counties Percent	Southern counties Number	Southern counties Percent
0	83	18.44	31	12.76
1	50	11.11	30	12.34
2	83	18.44	40	16.46
3	30	6.67	31	12.76
4	31	6.89	28	11.52
5	57	12.67	30	12.34
6	25	5.56	13	5.35
7	10	2.22	10	4.12
8	43	9.56	21	8.64
9	12	2.67	5	2.06
10	5	1.11	2	.82
11	11	2.44	1	.41
12	9	2.00	1	.41
13	1	.22		
Total intervals	450	100.00	243	99.99

Summary

The 3,095 counties of the United States have been divided north and south by a line representing a general westerly continuation of the parallel forming the southern boundary of Virginia and annual rates of reported incidence of poliomyelitis calculated for each county, 1932 through 1946. The frequency distributions of these rates reflect the probabilities of reporting poliomyelitis in the counties and sections during the 15-year period.

A rate observed only about 5 times or less in 100 epidemic opportunities is considered unusual enough to be regarded as epidemic. On this basis a rate of 35 or more per 100,000 is regarded as epidemic in northern counties and 25 or more per 100,000 in southern counties.

Degree of epidemicity has also been classified as "severely epidemic," "mildly epidemic," and "endemic" on the basis of observed occurrence and distribution of rates in the period 1932–46. A severe epidemic was reported about 3 times as frequently in northern as in southern counties.

When the counties are arranged in several population groups, it is found that epidemic risk decreased slightly from the less populous to the more populous counties in the northern section, but an opposite tendency was apparent in southern counties. In both sections the annual chance of a county reporting no case was, as expected, inversely related to population.

The observed frequency of recurrent epidemics within 15 years and within 5 years was not significantly different from that expected on an assumption that recurrence was due to chance. Observed recurrence within 3 years, however, was significantly less frequent.

No particular pattern was apparent in the distribution of yearly intervals between epidemics, though in approximately 50 percent this interval was less than 4 years.

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(*2*) Wernstedt, Wilh.: *In* Investigations on epidemic infantile paralysis, p. 255. Report from the State Medical Institute of Sweden to The XV International Congress on Hygiene and Demography, Washington 1912. Nordiska Bokhandeln, Stockholm.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 19, 1949

For the thirteenth consecutive week the incidence of poliomyelitis in the Nation decreased over the preceding week. The total number of cases reported for the week is 735 as compared with 751 last week. Twenty-six States and the District of Columbia reported decreases, 17 reported increases, and 5 reported no change. No State showed an increase or a decrease of more than 18 cases. The total number of cases of poliomyelitis for the year to date is 40,523 as compared with 25,691 for the corresponding week last year.

Influenza cases increased from 1,658 last week to 2,366 for the current week, chiefly because of an increase in the incidence in Texas (from 1,175 to 1,671) and Virginia (from 133 to 213). A decrease, however, was noted in West Virginia (from 28 to 13). Increases over the previous week occurred in most of the other diseases shown in the following table. Measles increased from 777 last week to 1,602 for the current week, but remained below the 1944–48 median of 1,696. Pneumonia increased from 1,001 to 1,524 for the week. Scarlet fever increased from 1,010 last week to 1,295 cases this week. Typhoid and paratyphoid fever increased from 40 to 58 cases, and infectious encephalitis increased from 9 to 21 cases. Tularemia increased from 8 to 15 cases, but no State reported more than 2 cases.

Two cases of anthrax were reported, one each in Pennsylvania and California: two cases of Rocky Mountain spotted fever were reported in North Carolina; and no cases of smallpox were reported.

Of 32 States reporting on rabies in animals, 17 reported no cases, while the remaining 15 reported a total of 104. The States reporting the largest numbers were New York (25) and Texas (19). The total number of rabies in animals reported to date is 5,016 cases as compared with 6,066 for the corresponding period last year.

A total of 8,799 deaths was recorded during the week in 93 large cities in the United States, as compared with 8,429 last week; 9,205 and 9,213, respectively, for the corresponding weeks of 1948 and 1947; and 9,205 for the 3-year (1946–48) median. For the year to date the total is 418,845, as compared with 419,834 for the same period last year. Infant deaths for the current week totaled 684; for last week 622; for the corresponding week last year 662; and the 3-year median, 686. The cumulative figure is 29,962 as compared with 30,573 for the same period last year.

Telegraphic case reports from State health officers for the week ended Nov. 19, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	------	------	------	48	1	19	3	------	14	------	------	1	7	------
New Hampshire	------	------	------	10	------	------	------	------	1	------	------	------	8	------
Vermont	------	------	------	------	------	------	1	------	1	------	------	------	4	------
Massachusetts	8	3	------	36	------	------	18	------	63	------	------	2	139	------
Rhode Island	------	------	------	------	------	4	2	------	4	------	------	------	24	------
Connecticut	------	------	1	11	1	36	15	------	13	------	------	------	114	------
MIDDLE ATLANTIC														
New York	6	1	[c] 3	81	9	261	98	------	[d] 74	------	------	4	283	25
New Jersey	1	------	4	43	1	96	35	------	22	------	------	------	239	------
Pennsylvania	2	------	------	59	7	62	13	------	45	------	------	8	248	------
EAST NORTH CENTRAL														
Ohio	6	1	1	19	4	39	30	------	133	------	------	2	113	7
Indiana	9	2	7	29	1	4	13	------	34	------	------	1	15	8
Illinois	------	1	2	30	4	90	36	------	34	------	1	------	131	1
Michigan [a]	3	2	------	197	2	34	45	------	64	------	2	1	146	7
Wisconsin	1	------	2	60	------	3	26	------	38	------	------	------	127	------
WEST NORTH CENTRAL														
Minnesota	2	1	------	82	------	6	20	------	35	------	------	------	10	------
Iowa	------	------	------	20	6	1	23	------	8	------	------	------	3	------
Missouri	3	------	1	3	------	1	10	------	11	------	------	5	6	------
North Dakota	1	2	23	108	------	------	4	------	14	------	------	------	1	------
South Dakota	------	1	------	10	------	------	19	------	4	------	------	1	------	------
Nebraska	------	------	20	8	------	3	12	------	14	------	------	------	------	------
Kansas	1	------	1	8	2	28	16	------	12	------	------	------	9	------
SOUTH ATLANTIC														
Delaware	------	------	------	4	1	------	------	------	3	------	------	------	7	------
Maryland [a]	1	------	------	9	------	108	16	------	21	------	1	1	57	------
District of Columbia	1	------	------	22	------	19	1	------	7	------	------	------	4	------
Virginia	12	------	213	4	3	60	6	------	35	------	------	3	34	1
West Virginia	9	------	13	38	------	6	3	------	30	------	------	4	21	------
North Carolina	31	------	------	57	1	------	8	2	95	------	2	1	23	------
South Carolina	13	------	12	2	------	14	2	------	15	------	------	------	11	4
Georgia	18	------	9	10	------	25	2	------	30	------	------	1	11	4
Florida	4	------	13	6	2	14	12	------	7	------	2	------	2	------

See footnotes at end of table.

Telegraphic case reports from State health officers for the week ended Nov. 19, 1949—Continued

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
EAST SOUTH CENTRAL														
Kentucky	8			2	1	12	22		50			1	5	10
Tennessee	10		26	20	1	45	9		62			2	41	
Alabama	25	1	26	27	5	27	6		33		1		5	5
Mississippi [a]	12		8	3	1	27	10		10				4	
WEST SOUTH CENTRAL														
Arkansas	11		55	6		20	7		3			3	10	1
Louisiana	2		2		1	29	4		5					
Oklahoma	3	1	71			22	20		8		1	2	5	2
Texas	20	2	1,671	40	1	288	39		28		1	4	65	19
MOUNTAIN														
Montana			2	32	2	1	1		9		1		1	
Idaho	2		39	12	2	9	11		10					
Wyoming	1			5		7	3		2		1		6	
Colorado	4		34	9		16	5		6				13	7
New Mexico				23	1	7	4		6				13	
Arizona			86	89	1	8	5		11			1	25	
Utah [a]				112		4	7		6		2		10	
Nevada									1					
PACIFIC														
Washington	2		2	118	1	10	6		34				25	
Oregon	5		10	18		19	8		23				31	
California	17	3	9	72	3	40	79		107			10	84	3
Total	254	21	2,366	1,602	65	1,524	735	2	1,295		15	58	2,140	
Median, 1944-48	393	7	2,104	1,696	65		289	1	1,726	2	11	75	2,132	
Year to date, 46 weeks	6,938	708	92,354	596,174	3,032	68,639	[1] 40,523	555	67,285	45	994	3,371	57,399	
Median, 1944-48	11,729	579	206,762	569,190	5,257		18,491	514	100,983	312	834	3,735	87,574	
Seasonal low week ends	(27th) July 9		(30th) July 30	(35th) Sept. 3	(37th) Sept. 17		(11th) Mar. 19		(32d) Aug. 13	(35th) Sept. 3		(11th) Mar. 19	(39th) Oct. 1	
Since seasonal low week	3,170		16,487	7,656	516		[1] 39,608		9,025	4		2,911	10,797	
Median, 1944-45 to 1948-49 [b]	5,438		17,078	10,258	591		18,228		14,688	39		3,260	11,699	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods (1944-45 to 1948-49).
[c] New York City only.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever currently reported separately as follows: New York 1, Virginia 2, Georgia 1, Tennessee 2, Texas 1, California 9. Cases reported as salmonella infection not included in the table were as follows: Massachusetts 2, New York 2.
[1] Deductions: Michigan, weeks ended January 29, September 17, November 5, and November 12, 1 case each.

Anthrax: Pennsylvania and California 1 case each.
Alaska: Influenza 1, measles 105, pneumonia 1.
Hawaii Territory: Influenza 350, scarlet fever 1, typhoid fever 1. Week ended November 12, diphtheria 1, influenza 51, measles 3, scarlet fever 1.

DEATHS DURING WEEK ENDED NOV. 19, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Nov. 19, 1949	Corresponding week, 1948
Data for 93 large cities of the United States		
Total deaths	9,799	9,205
Median for 3 prior years	9,205	
Total deaths, first 46 weeks of year	418,845	419,834
Deaths under 1 year of age	684	662
Median for 3 prior years	686	
Deaths under 1 year of age, first 46 weeks of year	29,962	30,573
Data from industrial insurance companies		
Policies in force	70,047,185	70,806,389
Number of death claims	12,802	12,859
Death claims per 1,000 policies in force, annual rate	9.5	9.5
Death claims per 1,000 policies, first 46 weeks of year, annual rate	9.1	9.3

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (human).—Information dated November 18, 1949, states that one case of proved human plague has been reported in Haina, Hamakua District. Onset was on October 31, 1949. This is the first case of human plague reported in Hawaii since April 1945.

Plague (rodent).—Plague infection was proved positive on October 26, 1949, in 1 mouse found dead in district 6A, Honokaa area, Hamakua District.

Panama Canal Zone

Notifiable diseases—September 1949.—Certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence[1]: Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	6		1		6		1		14	
Diphtheria	1				1				2	
Dysentery:										
Amebic	4						3		7	
Bacillary	2				2		4		8	
Hepatitis, infectious					1		2		3	
Influenza		1								1
Leprosy							1		1	
Malaria [2]	4				3		84	1	91	1
Measles					2		1		3	
Meningitis, meningococcal				1						1
Mumps					1				1	
Pneumonia		14		4	23	2		5	[3] 23	25
Poliomyelitis							1		1	
Tetanus					1				1	
Tuberculosis		9		5	5	2		8	[3] 5	24
Whooping cough		2			8				[3] 8	2
Yaws							3		3	
Yellow fever								1		1

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 5 recurrent cases. [3] Reported in the Canal Zone only.

Virgin Islands

Notifiable diseases—July–September 1949.—Cases of certain notifiable diseases were reported in the Virgin Islands of the United States as follows:

Disease	July	August	September
Ascaris		3	
Cancer of lower lip	1		
Chickenpox	1		
Enterobius		1	
Filariasis	3	2	4
Gonorrhea	11	12	16
Measles	1		
Mumps	1		1
Schistosomiasis	1		1
Strongyloidiasis			2
Syphilis	8	15	12
Tapeworm		2	
Trichuriasis	13	12	19
Tuberculosis, pulmonary			2
Whooping cough			1

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended November 5, 1949.—During the week ended November 5, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			20	5	146	198	60	60	68	135	710
Diphtheria					20	6		4			30
Dysentery, bacillary					9	7	2				18
Encephalitis, infectious							1				1
German measles	1				9	17	1	2	4	13	47
Influenza			7			4	6	1			18
Measles			9		88	45	116	139	49	123	569
Meningitis, meningococcal					1	2	2	1			6
Mumps			75		24	121	5	11	12	60	308
Poliomyelitis	1			2	2	7	1	7	7	1	28
Scarlet fever	3				56	32	6	1	37	13	148
Tuberculosis (all forms)	1		2	12	233	19	26	12	15	60	380
Typhoid and paratyphoid fever					18					2	20
Undulant fever					4	3				2	9
Venereal diseases:											
Gonorrhea	9	2	17	5	107	61	30	8	50		289
Syphilis	4	2	12	5	59	23	8	6	3		122
Whooping cough					86	50			2	8	146

CUBA

Habana—Notifiable diseases—5 weeks ended October 1, 1949.—During the 5 weeks ended October 1, 1949, certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	23		Poliomyelitis	1	
Leptospirosis	1		Scarlet fever	1	
Malaria	2		Tuberculosis	3	1
Measles	3		Typhoid fever	11	1

Provinces—Notifiable diseases—5 weeks ended October 1, 1949.—During the 5 weeks ended October 1, 1949, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	2	12	8	21		20	63
Chickenpox					1	2	3
Diphtheria	2	32	2			2	38
Leprosy	1	1					2
Malaria	4	2	1	3	3	6	19
Measles		3	3		2	13	21
Poliomyelitis	1	1				1	3
Rabies						1	1
Scarlet fever		1					1
Tetanus		1					1
Trachoma			1				1
Tuberculosis	8	12	12	39	3	18	92
Typhoid fever	14	22	10	7	1	96	150
Undulant fever						1	1
Whooping cough		1	4		1		6

[1] Includes the city of Habana.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Madagascar—Fianarantsoa Province.—During the period October 21–31, 1949, 9 fatal cases of plague were reported in Fianarantsoa Province, Madagascar.

Netherlands Indies—Java—Jogjakarta.—Cases of plague, all fatal, have been reported in Jogjakarta, Java, as follows: In Jogjakarta Residency, week ended October 15, 1949, 42 cases, week ended October 22, 46 cases; in Jogjakarta City, week ended November 5, 6 cases.

Smallpox

Burma—Bassein and Rangoon.—During the week ended November 5, 1949, 13 cases of smallpox, with 5 deaths, were reported in Bassein, Burma, and 10 cases with 2 deaths were reported in Rangoon; during the week ended November 12, 26 cases were reported in Bassein, and 8 cases in Rangoon.

Colombia.—During the month of September 1949, 249 cases of smallpox (alastrim) were reported in Colombia, including 32 cases in the city of Medellin.

French Equatorial Africa.—During the period October 11–20, 1949, 115 cases of smallpox, with 21 deaths, were reported in French Equatorial Africa.

Great Britain—England and Wales—Liverpool.—Information dated November 11, 1949, states that 2 cases of smallpox have been reported to the Medical Officer of Health in Liverpool. It is stated that the first case developed in a laboratory employee with onset October 29, and the second in the brother of the original patient with onset November 11.

Netherlands Indies—Java.—Smallpox has been reported in cities in Java as follows: Week ended November 5, 1949, Batavia 47 cases, Bandoeng 31 cases, Pekalongan 10 cases, Semarang 16 cases; week ended November 12, Batavia 84 cases.

Syria—Hama.—During the week ended October 22, 1949, 68 cases of smallpox were reported in the city of Hama, Syria.

Typhus Fever

Colombia.—During the month of September 1949, 305 cases of typhus fever with 11 deaths, were reported in Colombia, including 51 cases (murine type) in Medellin.

Yellow Fever

Gold Coast—Accra.—During the period October 15–17, 1949, 1 fatal case of yellow fever was reported in Accra, Gold Coast. It is stated that this case is believed to have had its origin in Kpandu, with onset on October 15. Death occurred in Accra on October 17.

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

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U S GOVERNMENT PRINTING OFFICE: 1949

Public Health Reports

VOLUME 64 **DECEMBER 16, 1949** NUMBER 50

IN THIS ISSUE

Nutrition Demonstration Program in Michigan

Oral Administration of Killed *Brucella* to Man

Q Fever From *Hyalomma savignyi* in Spain

Notifiable Diseases, Third Quarter, 1949

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CONTENTS

	Page
Report of a nutrition demonstration program in Ottawa County, Michigan. Elton S. Osborne, Elbert C. Tabor, Mary M. Bouser, Bernice L. Anderson, and Keith H. Frankhauser	1603
Oral administration of killed *Brucella* to man. Norman B. McCullough, C. Wesley Eisele, and Grace A. Beal	1613
Recovery of *C. burnetii* from *H. savignyi* collected in Spain. R. R. Parker, Joaquin de Prada, E. J. Bell, and David B. Lackman	1616
Schedule of CDC laboratory training courses	1619
Notifiable diseases, third quarter, 1949	1620
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended November 26, 1949	1625
Deaths during week ended November 26, 1949	1628
Territories and possessions:	
Hawaii Territory—Plague (rodent)	1628
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended November 12, 1949	1628
Norway—Notifiable diseases—August 1949	1629
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Cholera	1629
Plague	1629
Smallpox	1629
Typhus fever	1630
Yellow fever	1630

Public Health Reports

Vol. 64 • DECEMBER 16, 1949 • *No. 50*

Report of a Nutrition Demonstration Program In Ottawa County, Michigan

By Elton S. Osborne, Jr., M. D.,* Elbert C. Tabor, Mary M. Bouser, Bernice L. Anderson, and Keith H. Frankhauser, M. D.**

Epidemiological surveys constitute one phase of a comprehensive public health nutrition program, which also should include nutrition education and training, and corrective and preventive services. Many of the nutrition activities undertaken up to this study, however, have centered largely around nutrition surveys. The teams organized by the Nutrition Branch of the Public Health Service have concentrated on surveys of the nutritional status of various population groups. While surveys of nutritional status are useful and desirable from an epidemiological point of view and serve to stimulate local interest in the field of nutrition, they can make only a limited contribution toward the realization of the long-range objective—establishment of nutrition control programs on a par with other aspects of a health department's responsibilities.

Therefore, it seemed desirable for a nutrition unit to develop a pattern for a unified public health nutrition program and to determine how it could be adapted to a specific health department program. Planned as one part of the program, the survey would supply epidemiological data which would be used in further developing the program. Such a project was worked out by the nutrition unit of the Public Health Service assigned to work in Michigan. In the spring of 1946, as the result of cooperative planning between the unit and the State health department, an effort was made to broaden the area of nutrition activities for which the unit was responsible. The broad objectives were to investigate and demonstrate a comprehensive public health approach to the nutritional problems of a community and to incorporate nutrition programs in local health departments on a basis similar to traditional programs in communicable disease, venereal disease, tuberculosis control, and maternal and child

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health. With these purposes in mind, plans were made, in cooperation with the Michigan State Department of Health and the Ottawa County Health Department, to establish a public health nutrition program in Ottawa County.

Ottawa County is located on the shore of Lake Michigan and includes the cities of Holland, Grand Haven, and Zeeland. The area of the county is 564 square miles, and the population density is 113.2 persons per square mile. In 1946 there was an estimated population of 63,800 persons, of whom 44 percent were considered urban and 56 percent rural. The urban population is engaged principally in small industries, and the rural population in agricultural pursuits.

The Ottawa County Health Department was staffed, in 1946, by a full-time health officer, eight public health nurses, one full-time dentist who served the county's school children, one sanitarian, and three clerks.

It was agreed that the program was to be a joint cooperative project of the Ottawa County Health Department and the nutrition unit of the Public Health Service. The program consisted essentially of three phases: (1) epidemiological surveys; (2) in-service training of the health department staff; and (3) preventive and corrective measures, through popular education and community services.

The following specific purposes were envisioned for the Ottawa County nutrition program:

1. To determine whether practical nutritional epidemiology could be obtained for an entire county of moderate size by a small special unit, which a State health department might be capable of financing, and which would work in close cooperation with a moderate-sized local health department.

2. To develop an active program of in-service training for a local health department staff in order to create sustained interest in nutrition which would be carried over to the general work of the department.

3. To demonstrate that active participation by local public health nurses in the epidemiological phase of the program can be added to the nurses' duties without unduly disrupting their general program.

4. To indicate that specific nutritional deficiencies and other physical defects discovered during nutritional survey examinations can be included in the case loads of public health nurses until corrective measures have been obtained.

5. To demonstrate the necessity for continuing, after the epidemiological phase, the in-service training and the provision of special assistance for unusual nutritional cases and problems in order to maintain nutrition as an integral part of the local public health program.

6. To show how the utilization of every available education medium, such as the press, radio, schools, civic clubs, and other general educational facilities and methods, can contribute to the improvement of nutritional well-being.

7. To demonstrate that nutritional epidemiological units can include mass blood glucose determinations as a practical preliminary screening procedure for diabetes mellitus.

8. To indicate how an analysis of statistics on physical findings, dietary records, and laboratory data accumulated in nutrition surveys may contribute toward the knowledge of the significance of this information.

9. To demonstrate that a public health nurse with training in nutrition can work as a field nurse with a local health department and develop new techniques to be used in home visits to help improve the family's nutrition.

10. To demonstrate that a public health nutritionist can be a valuable addition to a county health department by providing continuous in-service training for the staff, by offering consultation on special nutritional problems, by participating in the clinics, and by contributing to long-range and continuing nutrition education programs.

Preliminary Plans and Arrangements

In November 1946, the Public Health Service nutrition unit joined the staff of the Ottawa County Health Department, with headquarters in Grand Haven, and plans were made to implement the program previously agreed upon. A qualified biostatistician selected a representative sample of the population of the area for the nutrition survey. It was decided to study 1,000 families in Ottawa County—450 families from the larger urban areas and 550 from the rural areas of the county.

Since this program was to become an integral part of the activities of the county health department, the selection of survey clinic locations was left to the health officer. Fourteen clinic locations were arranged in the county for maximum convenience to the families invited to attend. Clinics were so arranged that no family need travel more than 5 miles to attend a session.

Since the county health department desired to keep a permanent record of the findings for every individual who participated in the survey, a new set of forms was designed for this purpose. A set of three 5 by 8 card forms was used for recording physical findings, dietary record analyses, and laboratory data, respectively. The three cards could be stapled together to form a permanent individual

record or be used as reference by field nurses in their home visits to the participating families.

The Ottawa County Medical Society approved the purposes and plans of the program. The Society suggested that the families examined in the survey be asked to indicate their family physician in order to enable the health department to send a complete report of the findings to the designated family physician. This was provided for by forwarding a copy of the forms prepared for the health department to the family physician.

The date for the beginning of the survey was set for April 1, 1947, and clinics were scheduled from April 1947 to March 1948. An attempt was made to obtain samples of comparable groups of urban and rural families during each of the seasons of the year.

Before the survey was begun, a series of in-service educational classes was held for the county health department staff. The classes were conducted by the unit's public health nurse and nutritionist, with some help from the medical officer. These sessions were designed to acquaint the health department staff with the latest available nutrition information and to discuss problems which might arise in inviting selected families to the survey clinics.

County newspapers aided in the preliminary planning by describing and publicizing the program, while ministers in the rural churches offered valuable assistance in obtaining the cooperation of their congregations. In addition, many talks about the program were given by staff members of the health department as well as by the staff of the nutrition unit.

Methods of Conducting Survey

The Ottawa County survey started in April 1947. Invitations to attend the nutrition clinics were extended to the people in the selected sample by the county health department nurses. They were assisted in this by the Public Health Service nutrition unit nurse.

The county health department nurses made 14,056 home visits during 1947. Of this figure, 1,144 visits were made to invite families to the nutrition clinics. Thus, these invitations accounted for 8.1 percent of the nurses' general case load, exclusive of the number of calls made for follow-up purposes.

Considerable variation was noted in the response to the invitations to attend the nutrition clinics. The different backgrounds and customs of the people visited or the rapport established between the nurse and the family may account for the variations. It was obvious that the nurse's interest in the nutrition program and her approach to the family had a considerable bearing on her ability to obtain the family's cooperation. When the nurse was able to win the family's confidence

and give a good explanation of the program, the response was excellent. On the other hand, if the nurse evidenced little interest in the program, she failed to win confidence and had greater difficulty in getting appointments filled.

Survey clinics were conducted on Tuesday and Thursday of each week; morning, afternoon, and evening sessions were held in most areas to offer maximum convenience for the selected families.

The clinic teams were composed of a physician, nutritionist, laboratory technician, public health nurse, and clerk. The clerk acted as receptionist, kept records, and took height and weight measurements of the clinic subjects. The unit's public health nurse served as clinic nurse and was responsible for the general operation of the clinic.

Specimens of fingertip blood from each subject were collected by the laboratory technician. The following laboratory determinations were made: (a) plasma protein, (b) serum vitamin A, (c) serum carotene, (d) serum ascorbic acid, (e) serum phosphatase for subjects under 16 years of age, and (f) blood glucose for subjects 40 years of age and over.

At the time of the home visit, the nurse provided the family with forms on which each member was to record his 24-hour food intake. For children under 10 years of age, the mother did the recording. When the person came to the clinic, the nutritionist reviewed the dietary record for completeness and accuracy. The individual's food intake was compared with the basic food groups suggested by the National Research Council's recommended dietary allowances.[1] The nutritionist offered advice whenever this seemed desirable.

Each individual who attended the nutrition survey clinic was examined by a medical officer for physical signs which might be related to nutritional deficiencies. This information was then recorded on forms devised by the Nutrition Branch of the Public Health Service. The physical inspections followed the outline suggested by Sandstead and Anderson.[2]

Information about any obvious deficiencies found was given to a responsible member of each family; where necessary, individuals were referred to their family physician. A surprisingly large number of previously undiscovered physical defects, both of a nutritional and non-nutritional nature, such as rheumatic fever and dental caries, were brought under professional care as a result of this referral system. Physical defects were also reported to the local health officer who assigned each case to district public health nurses for home visits.

---

[1] Recommended Dietary Allowance. National Research Council, Reprint and Circular Series No. 122, Washington, D. C. 1945 revision.

[2] Sandstead, Harold R., and Anderson, Richmond K.: Nutrition studies. I. Description of physical signs possibly related to nutritional status. Pub. Health Rep. 62: 1073–1085 (1947). Reprint 2799.

In connection with the program, the nutrition unit attended weekly staff meetings of the local health department to discuss any problem which might arise.

The in-service education program for the county health department staff was begun in February 1947, prior to the beginning of the survey, and was continued at intervals during the entire program. The following subjects were discussed: food values and cost of milk and cereals in the diet, nutrition and blood regeneration, vitamins and vitamin deficiency diseases, methods of obtaining diet records, use and analysis of diet records, etc.

During the course of the survey, it was necessary to carry on a continuous campaign to maintain public interest and cooperation in the project. Various public information media were utilized for this purpose—newspapers, radio, clubs, groups and classes. The necessity for continuing public relations activities in connection with programs such as these serves to emphasize the need for the full-time participation of a health education specialist.

Survey Data of Nutritional Status

No attempt has been made in this report to give a complete analysis of all the data accumulated for the 2,551 individuals who participated in the survey. However, the figures included afford a picture of the nutritional status of the group which participated. Every attempt was made to obtain a representative sample of the population of Ottawa County. Analysis of the data indicate, however, that for the selected sample children responded to a proportionately greater extent than the older people.

Dietary Findings

The dietary information was analyzed to show the percent of individuals who ate the quantities of the basic food groups suggested by the National Research Council's recommended dietary allowances. Some of these results are:

Food group	*Percent reporting recommended intake*
Leafy, green and yellow vegetables	46
Vitamin C-rich foods	49
Other vegetables and fruits	68
Milk	40
Meat, poultry and fish	62
Eggs and cheese	55
Whole grain products	45
Enriched grain products	90
Iodized salt	46

Laboratory Findings

The results of the blood studies showed that 25 percent of the people had good or excellent hemoglobin levels according to the standards used (table 1). There were 79 percent of the cases in the good or excellent category for serum vitamin A (table 2), 43 percent in the same groups for serum carotene (table 3), 67 percent in these groups for serum ascorbic acid (table 4), 97 percent in the satisfactory group for plasma protein levels (table 5), and 92 percent of the cases satisfactory as far as blood phosphatase values were concerned (table 6).

Table 1. *Results of hemoglobin determinations on a representative sample of population, Ottawa County, Michigan, 1947–48*

Classification	Number subjects	Percent of total	Standards in gms./100 cc. whole blood		
			Male		Female total
			Below 13 yrs.	13 yrs. and over	
Total	2,540	100.0			
Poor	342	13.4	Less than 11.0	Less than 12.0	Less than 11.0
Fair	1,577	62.0	11.0–12.9	12.0–13.9	11.0–12.9
Good	468	18.5	13.0–13.9	14.0–14.9	13.0–13.9
Excellent	153	6.1	14.0 and over	15.0 and over	14.0 and over

Table 2. *Results of blood serum vitamin A determinations on a representative sample of population, Ottawa County, Michigan, 1947–48*

Classification	Number subjects	Percent of total	Standards expressed in mcg./100 ml. serum
Total	2,372	100.0	
Poor	117	4.9	Below 20
Fair	389	16.4	20–29
Good	1,233	52.0	30–49
Excellent	633	26.7	50 and over

Table 3. *Results of blood serum carotene determinations on a representative sample of population, Ottawa County, Michigan, 1947–48*

Classification	Number subjects	Percent of total	Standards expressed in mcg./100 ml. serum
Total	2,378	100.0	
Poor	312	13.1	Below 75
Fair	1,026	43.2	75–124
Good	854	35.9	125–199
Excellent	186	7.8	200 and over

As an adjunct to the nutrition survey, a screening program for diabetes was carried on. Blood glucose determinations were made on 550 individuals 40 years and over. Finger-tip blood was obtained for this test from one to three hours after the last meal. There were 89 persons who had blood glucose levels of 150 milligrams or more per 100 ml. of blood. These individuals were considered to be potential diabetics and were referred to their family physician for additional study.

Table 4. *Results of blood serum ascorbic acid determinations on a representative sample of population, Ottawa County, Michigan, 1947–48*

Classification	Number subjects	Percent of total	Standards expressed in mcg./100 ml. serum
Total	2, 461	100. 0	
Poor	246	9. 9	Below 0.4
Fair	559	22. 7	0.4–0.6
Good	574	23. 4	0.7–1.0
Excellent	1, 082	44. 0	1.1 and over

Table 5. *Results of plasma protein determinations on a representative sample of population, Ottawa County, Michigan, 1947–48*

Classification	Number subjects	Percent of total	Standards expressed in gm./100 cc.
Total	2, 320	100. 0	
Poor	10	0. 4	Under 6. 0
Fair	59	2. 5	6. 0–6. 4
Satisfactory	2, 251	97. 1	6.5 and over

Table 6. *Results of phosphatase determinations on individuals 16 years and under in a representative sample of population, Ottawa County, Michigan, 1947–48*

Classification	Number subjects	Percent of total	Standards expressed in ml. units
Total	1, 091	100. 0	
Satisfactory	1, 004	92. 0	Under 15
Unsatisfactory	87	8. 0	15 and over

Physical Findings

In the survey, 2,551 persons were inspected for signs commonly associated with nutritional deficiencies. It should be recognized, however, that there are serious limitations to making positive diagnoses of deficiency states based solely on the evidence presented

through many of these signs. Physical signs were observed which are associated with a deficiency of the following food factors:

Vitamin A. Findings varied greatly for the physical signs reported to be associated with vitamin A deficiencies; 1.5 percent of the persons examined showed signs of follicular hyperkeratosis, 3.8 percent blepharitis, and 35.1 percent had thickening of the bulbar conjunctiva.

Vitamin B Complex. 18.3 percent of all the individuals who were examined had changes in the tongue which have been associated with vitamin B-complex deficiency states. Nasolabial seborrhea and follicular plugs appeared together in only 0.9 percent of the persons examined. Angular stomatitis was found in 0.9 percent of the individuals. Circumcorneal injection was present in 5.5 percent of the cases.

Ascorbic Acid. Gingivitis was present in 12.9 percent of the people examined. However, perifollicular petechiae were seen in only one individual and purpura in two persons.

Vitamin D. Skeletal changes, which are frequently attributed to the existence of rickets, were found in 23.0 percent of all the individuals examined; 23 percent of the individuals 16 years of age and under had three or more skeletal deformities which were probably of rachitic origin.

Iodine Deficiency. 11.3 percent of all the individuals examined had palpably enlarged thyroid glands.

Discussion of Survey Data

The survey data revealed that about half of the people surveyed did not secure as large amounts of basic foods as suggested in the National Research Council's recommended dietary allowances.

Because stigmata of rickets were discovered in many of the individuals examined, inquiries were made about the use of vitamin D supplements in this area. Physicians who were asked stated that they recommend vitamin D supplements for all infants under their care. Some parents felt that such supplements were harmful or unnecessary to the children during the warmer months of the year and, as a result, many children failed to receive supplementary vitamin D during these months.

There is insufficient use of iodized salt in this iodine-deficient area. The enlarged thyroids observed in these examinations might have been prevented by the more widespread use of iodized salt.

As explained earlier, the demonstration program in Ottawa County was to have been a comprehensive one, including both in-service training and educational and preventive measures as well as the nutrition survey. However, only the epidemiological survey was

carried through to its conclusion at the time the nutrition unit left this area. The preventive and correctional phase of the nutrition program was not completed because unforseen circumstances resulted in the termination of the cooperative program.

Epidemiological findings revealed that significant nutritional problems existed in Ottawa County despite the fact that it was a fairly prosperous area and was served by a well-organized health department. The in-service training program in nutrition was under way at the time the unit left the county; the majority of the staff of the local health department had become aware that nutrition was a public health problem and that a nutrition program should be on a par with other phases of the public health program.

Conclusions

1. It was demonstrated that an epidemiological unit in nutrition, such as the demonstration unit of the Public Health Service, can obtain valuable information about the nutritional status of various groups in the population.

2. The in-service training in nutrition provided for the staff of the Ottawa County Health Department was well received and created an active interest in the field of nutrition.

3. It was found that active participation by the local public health nurses in the nutrition survey did not unduly disrupt their generalized nursing program.

4. Public health nurses attached to the health department were very successful in the work of following up some of the more severe nutritional deficiency and other cases found in the survey clinics As a result, many cases were brought under professional care.

5. The necessity for a continuing nutrition program, aimed toward the prevention and correction of the suboptimal nutritional conditions found in Ottawa County, was clearly shown in the results of the survey.

Oral Administration of Killed *Brucella* to Man

By NORMAN B. MCCULLOUGH, Ph. D., M. D.*, C. WESLEY EISELE, M. D.**, and GRACE A. BEAL**

Brucella agglutinins have been observed in many persons who have had no illness suggestive of brucellosis and no known adequate exposure to live *Brucella* organisms. It is also recognized that there is a high incidence of dermal sensitivity to *Brucella* products in the absence of a history of illness or exposure. This is true even among persons who have always lived in large cities and can give no history of raw milk consumption. The possibility occurs that the ingestion of dead *Brucella* in pasteurized dairy products may be responsible for the presence of *Brucella* agglutinins. The following experiments were designed to clarify this point.

Materials and Methods

Subjects. Healthy adult male volunteers at a State penal institution were the subjects. The milk used in this institution is pasteurized and obtained from a single source. In such a closed environment, the possibility of exposure other than that experimentally designed is practically nonexistent. Volunteers were carefully selected in reference to previous exposure history and residence. No individuals were included who had been employed as farmers, packing house workers, butchers, dairymen, or in similar occupations. Individuals who had received cholera vaccine were also rejected. The selected volunteers were then further screened by the use of the agglutination test, the opsonocytophagic test, and the brucellergen skin test. All individuals developing antibodies following this skin test were eliminated.

Subjects (except group III B) used in this experiment then were known to be free of detectable previously existing antibody, thus minimizing the possibility of confusion incident to fluctuation in titer of such antibody or the reappearance of latent antibody.

Material. A commercial heat-killed *Brucella* vaccine [1] consisting of equal parts of *Brucella abortus* and *Brucella suis* was used. The calculated daily dose was administered in a glass of pasteurized milk following the noon meal. The antigenicity of this vaccine was established by parenteral administration to a similarly selected control group of eight

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*Department of Medicine, The University of Chicago, and the Laboratory of Infectious Diseases, National Institutes of Health, Bethesda, Md. **Department of Medicine, The University of Chicago. This project was aided in part by a grant from Swift & Co., Chicago, Ill.

[1] We are indebted to Lederle Laboratories, Pearl River, N. Y., for a generous supply of this vaccine.

individuals, all of whom developed high agglutination titers against *Brucella* and marked opsonocytophagic responses.

Methods. The agglutination test was performed by the standard test-tube method with incubation at 37° C. for 48 hours. The antigen employed is routinely used in our laboratory. It is prepared from several recently isolated, smooth, virulent strains of *Brucella.* A photoelectric colorimeter is used for turbidimetric standardization. Each lot is further standardized by comparing its action with the preceding lot on selected antisera. The lowest dilution of serum used was 1 to 20. The opsonocytophagic test and the brucellergen skin test were performed according to Huddleson (*1*).

Experimental Procedure

Thirty volunteers were divided into three groups of 10 men each:

Group I received one million organisms per feeding.
Group II received 100 million organisms per feeding.
Group III received one billion organisms per feeding.

An additional group of 10 men was held as a control group.

In the initial experiment, feedings were given to all groups daily 6 days a week for a period of 6 weeks. Subsequently, the feeding periods of all groups were extended as detailed later. The *Brucella* agglutination and opsonocytophagic tests were performed at 2-week intervals during the feeding period and for 6 weeks thereafter. The skin test was repeated 6 weeks after the end of the feeding period, and agglutinins and opsonins were again followed after the skin test.

Since all of these tests remained completely negative, a further feeding was conducted. The same groups of men were continued at the same dosage levels with feedings given once a week for an additional 3 months. The total number of feedings was thereby brought to 49, scattered over a period of approximately 6 months.

An additional 12 individuals (group III B) were included in this experiment and given the highest dosage level (one billion organisms per feeding). Eight of these 12 had moderately positive brucellergen skin tests prior to their inclusion in the study. Four had a previous rise in agglutinins following a negative skin test. Hence, all 12 of these may be regarded as having latent antibody, although the agglutination and opsonocytophagic tests were negative at the start of the feeding.

As in the initial experiment, the agglutination and opsonocytophagic tests were performed at intervals during and after the feeding period. The brucellergen skin test was repeated 2 weeks after the end of feeding and the agglutination and opsonocytophagic tests repeated thereafter. Four months after the end of the feeding period, all three tests were again repeated.

Results

In the initial experiment consisting of 36 feedings over a period of 6 weeks, all individuals in the three experimental groups remained completely negative to all the tests detailed.

In the further feeding experiment, the results were as follows:

Group I. Seven of the 10 individuals completed the feeding period, 3 being dropped because of discharge from the institution. All seven of the individuals completing the feeding remained entirely negative to all tests. (One individual was not available at the 4-month post-feeding test.)

Group II. All of the individuals completed the feedings, and eight were available at the 4-month post-feeding test. They likewise remained negative to all the tests throughout.

Group III. All 10 individuals completed the feeding. Eight were available for testing at the 4-month post-feeding period. The agglutination test and the brucellergen skin test were completely negative at all times. At the end of the feeding period, three individuals showed slight to moderate opsonic activity which regressed to practically negative one month later.

Group III B. All 12 individuals completed the feedings. At the end of the feeding period and prior to repeating the skin tests, the agglutination tests were completely negative in all individuals. However, six men at this time showed demonstrable opsonic activity. One of these showed a fairly strong reaction. (Of 25 cells, 14 showed marked phagocytosis, 7 moderate, 4 slight, and none negative.) The four individuals whose skin tests were negative prior to the feeding remained negative at the end of the feeding period; in those previously positive, the degree of positivity was not increased afterwards. Following the repeat skin test, five individuals developed low agglutination titers of 1:20 or 1:40. At the 4-month post-feeding test, 11 men were available. The agglutination and opsonocytophagic tests were completely negative in all individuals at this time, and the brucellergen skin test response was unchanged.

The control group of 10 men was tested at the intervals detailed. With repeated testing and observation over the period of 10 months, all remained negative to all tests.

Discussion

It is apparent that prolonged feeding of killed *Brucella* to healthy individuals, even with maximum total doses of 49 billion organisms, failed to produce significant agglutination titers or dermal sensitivity. This is in accord with the results of previous workers (*2*). The maximal doses fed, but not the smaller doses, stimulated demonstrable

opsonic activity in nine individuals. Six of these men were in group III B which was regarded as having pre-existing latent antibody present, and hence might be expected to respond to a smaller antigenic stimulus than the other experimental subjects. The dosage levels selected are those which we believe might approximate natural conditions obtaining in pooled market milk as well as in milk drawn primarily from heavily infected herds.

REFERENCES

(1) Huddleson, I. F.: Brucellosis in man and animals. The Commonwealth Fund, New York, 1943.
(2) Dolman, C. E., Hudson, V., and Mathias, D. G. B.: Further observations on brucellosis in and around Vancouver. Canad. Pub. Health J. 30: 100 (1939).

Recovery of *C. burnetii* from *H. savignyi* Collected in Spain

By R. R. Parker, Ph. D.,† Joaquin de Prada, M. D.,* E. J. Bell, D. Sc.,** and David B. Lackman, D. Sc.**

Two strains of *Coxiella burnetii* have been recovered from 16 adult specimens of *Hyalomma savignyi* collected April 25, 1949, from a sheep in the village of Boboda, Province of Salamanca, Spain. This is the first proof of the occurrence of *C. burnetii* in that country, although its clinical presence has been suspected for some time by one of the authors (de Prada).

Test Data

The 16 specimens of *H. savignyi* were received at the Rocky Mountain Laboratory May 1, 1949. They were tested in two groups, one containing 4 living ticks, the other 12 dead specimens. Each group was soaked for 2 hours in merthiolate solution 1:1000, rinsed thoroughly in several changes of sterile distilled water, and triturated in 3 ml. of sterile saline solution. Of each resulting suspension, one guinea pig was injected with 1 ml. subcutaneously and another with 2 ml. intraperitoneally. A strain of *C. burnetii* was recovered from each group.

Both strains were maintained through two passages. The transfer inoculum in each instance was a saline suspension of spleen tissue from the sacrificed donor. Either two or four fresh guinea pigs

†Died Sept. 4, 1949. *Valladolid, Salamanca, Spain. **Rocky Mountain Laboratory, Hamilton, Mont.

were used. Each recipient was injected with 1 ml. of the suspension, half of the animals being injected subcutaneously and half intraperitoneally. Heart blood taken from each donor when sacrificed was bacteriologically sterile.

All surviving original and passage animals were tested for immunity against Q fever rickettsiae (Nine Mile strain). The challenge inoculum was like the inoculum used for strain passage except that the spleen tissue was from guinea pigs infected with a known strain of Q fever; each challenged animal received 1 ml. of suspension intraperitoneally. Six fresh control guinea pigs were similarly inoculated with each challenge inoculum; all reacted typically.

Test of Living Ticks

The guinea pig receiving the tick suspension subcutaneously was irregularly febrile from the 7th to the 19th day. It died following bleeding on the 29th day. Its serum was anticomplementary in the complement fixation test. The intraperitoneally injected animal became febrile on the 6th day and on the 8th day was sacrificed and material transferred to four animals.

One first-passage animal died of an intercurrent infection, and one was sacrificed on the 14th day (the 4th day of fever) and was transferred to four second-passage animals. Of the other two guinea pigs, one had 3 days of fever (12th to 14th), the other only one day (12th). Both were bled on the 21st day and both were positive for Q fever by the complement fixation test at serum dilutions of 1:64 and 1:128, respectively. One of these two animals died following bleeding; the other was immune to Q fever rickettsiae injected on the 34th day.

One second-passage animal was sacrificed on the 7th day (5th day of fever) and transferred to two third-passage guinea pigs. Another was sacrificed on the 9th day (3d day of fever); its spleen was frozen and placed under CO_2 refrigeration. The other two animals were both febrile (9th to 13th day and 7th to 9th day, respectively). Both were bled on the 21st day and both were positive for Q fever by the complement fixation test at a serum dilution of 1:512. They were also immune to Q fever rickettsiae injected the 21st day.

Results with the two third-passage animals were valueless because of intercurrent infection.

Test of Dead Ticks

Both tick-suspension-injected guinea pigs were febrile from the 9th to the 13th day. Blood taken the 29th day from the subcutaneously injected animal was positive for Q fever in the complement fixation test at a serum dilution $>$1:256. This guinea pig was challenged on the 34th day but died 7 days later of an intercurrent

infection. The intraperitoneally injected animal was sacrificed on the 17th day and material transferred to four guinea pigs.

Of the four first-passage animals, one of those injected subcutaneously was sacrificed on the 14th day (3d day of fever) and was transferred to two guinea pigs. Of the other three passage animals, one had 1 day of fever, another 2 days, and the third remained afebrile. On the 27th day, they were bled and then challenged. Each was positive in the complement fixation test (at serum dilution of 1:128 or greater) and each was also immune to Q fever.

In contrast to the first-passage animals, the two second-passage guinea pigs had marked febrile reactions which began the 6th day. Both were bled on the 15th day. The complement fixation test for the subcutaneously injected animal showed only a trace of fixation at 1:8. This animal died following bleeding; its spleen was enlarged three times, and there was a typical subcutaneous lesion. The intraperitoneally injected guinea pig was serologically positive at a dilution of $>1:256$ (bled 28th day) and was immune to the challenge inoculation given on the 49th day.

Discussion

The identification of the infectious agent isolated from the two groups of *H. savignyi* as *C. burnetii* is clearly justified by the positive complement fixation and immunity tests for Q fever.

Blanc et al. in 1946[1] reported the recovery of *C. burnetii* from ticks of this same species collected from the ground near the burrows of gerbils (*Meriones shawi*) in Southern Morocco. This strain was forwarded to the Rocky Mountain Laboratory in specimens of *Rhipicephalus sanguineus*. Although these ticks were dead and quite dry upon receipt in October 1946, the infectious agent was readily recovered from them, and complete cross-immunity was demonstrated between this Moroccan strain and American, Australian, Italian, and Panamanian strains of Q fever.

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[1] Blanc, G., Martin, L.-A., and Maurice, A.: Sur une Rickettsia isolée de Tiques dans le Sud marocain. Son identité probable avec *R. burneti* agent de la Q fever. Compt. rend. Acad. d. Sci. 223: 438–439 (1946).

Laboratory Training Courses for 1950

The Communicable Disease Center of the Public Health Service has scheduled a series of training courses to be given during 1950 in the laboratory diagnosis of various diseases.

The 1- to 3-week courses planned for the year are:

Serological diagnosis of rickettsial diseases—Jan. 9–13; Identification of medically important arthropods—Feb. 13–24; Parasitic diseases: Part 1. Intestinal parasites—Mar. 27–Apr. 14; Part 2. Blood parasites—Apr. 17–May 5; Rabies—May 8–12; Bacterial diseases (directors)—May 22–26; Mycotic diseases (directors)—May 29–June 2; Tuberculosis (directors)—June 5–9; Parasitic diseases (directors)—June 12–14.

Mycotic diseases: Part 1. Cutaneous and subcutaneous fungi—July 24–Aug. 4; Part 2. Systemic fungi—Aug. 7–17; Tuberculosis—Aug. 21–Sept. 7; General bacteriology, Part 1—Sept. 11–22; General bacteriology, Part 2—Sept. 25–Oct. 6; Enteric diseases: Part 1. Introductory enteric bacteriology—Oct. 9–13; Part 2. Advanced enteric bacteriology—Oct. 16–27.

Parasitic diseases: Part 1. Intestinal parasites—Sept. 18–Oct. 6; Part 2. Blood parasites—Oct. 9–27; Identification of medically important arthropods—Nov. 13–24; Virus isolation and identification techniques—Nov. 13–17; Influenza—Nov. 20–24; Rabies—Nov. 27–Dec. 1.

Information and applications should be requested from the Chief, Laboratory Division, Communicable Disease Center, 291 Peachtree Street, N. E., Atlanta, Georgia.

Notifiable Diseases, Third Quarter, 1949 [1]

The figures in the following table are the totals of the monthly morbidity reports received from Statehealth authorities for July, August, and September 1949, and show the numbers of cases reported by the required reporting sources in the respective States. They are preliminary and are subject to correction by final reports. They may be assumed to represent the civilian population only, although in some instances a few cases in the military population may be included. The comparisons made are with similar preliminary reports; but owing to population shifts in many States since the 1940 census, the figures for some States may not be comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State, although some do not do so. The list of diseases required to be reported is not the same for each State. Only a few of the common communicable diseases are notifiable in all the States. In some instances cases are reported, in some States, of diseases that are not required by law or regulation to be reported and the figures are included although manifestly incomplete. There are also variations among the States in the degree of, and checks on, the completeness of reporting of cases of the notifiable diseases; therefore comparisons as between States may not be justified for certain diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as cancer, puerperal septicemia, rheumatic fever, and Vincent's infection, are not reportable. However, the figures are recorded as reported.

In spite of these and other deficiencies inherent in morbidity reporting, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating trends by providing a comparison with similar preliminary figures for prior years. The table gives a general picture of the geographic distribution of certain diseases, as the States are arranged by geographic areas.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for July, August, and September, 1949

Division and State	Anthrax	Chickenpox	Conjunctivitis [2]	Diphtheria*	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria [3]	Measles*	Meningitis, meningococcal*	Mumps	Ophthalmia neonatorum	Pellagra	Pneumonia, all forms
NEW ENGLAND																		
Maine	----	174	----	3	----	----	----	----	44	----	12	1	149	3	240	----	----	95
New Hampshire	----	9	----	1	----	----	----	----	20	----	5	----	15	1	82	----	----	19
Vermont	----	91	----	----	----	----	----	----	27	----	----	----	109	----	261	----	----	2
Massachusetts	----	797	----	58	1	7	----	4	286	----	----	2	593	12	890	50	----	----
Rhode Island	----	24	----	1	----	----	----	----	8	----	8	1	47	1	80	----	----	35
Connecticut	----	124	8	2	6	2	----	1	53	1	2	----	612	7	343	----	----	272
MIDDLE ATLANTIC																		
New York	4	1,137	----	29	202	307	----	9	501	29	[4] 2	14	2,481	39	1,149	5	----	1,555
New Jersey	----	759	----	10	28	12	2	10	241	----	23	15	1,401	18	839	1	----	488
Pennsylvania	3	638	----	39	12	9	----	9	206	----	13	1	2,167	53	1,139	2	----	579
EAST NORTH CENTRAL																		
Ohio	1	370	----	35	12	10	56	----	113	----	12	1	1,974	28	938	96	----	442
Indiana	----	49	----	126	----	7	7	13	12	----	54	3	230	4	88	----	----	67
Illinois	1	350	81	9	147	85	----	24	164	----	10	[5] 3	1,010	39	698	62	----	775
Michigan	----	456	21	31	100	57	----	14	183	16	14	1	1,345	19	434	5	----	344
Wisconsin	----	804	----	1	2	----	----	3	208	----	152	2	1,703	6	965	1	----	[6] 39

WEST NORTH CENTRAL																		
Minnesota		138		11	23	40	2	2		4	4	11	164	20				98
Iowa		83		4				6	10				169	6	235			12
Missouri		69		23			18	1			8	1	59	25	155			99
North Dakota		36		2	1			96			36		113	12				88
South Dakota		33		2				28					63	15	33			6
Nebraska		33		9	1			3			44		61	3	103			13
Kansas		147		7	2			1	9	2	27		170	2	223		1	78
SOUTH ATLANTIC																		
Delaware		12		1				1					29	3	11			2
Maryland		51		29	3	11	4		36		5	5	116	3	89			198
Dist. of Columbia		26		7		31							113	3				161
Virginia		169		34	11		3,390				1,076	9	303	21	205		1	374
West Virginia		12	1	45		1			3		77		119	15	59			23
North Carolina				129	40	22						31	399	14				
South Carolina				56	3	70			14	40	363	134	451	7	152	3	18	221
Georgia		35	15	109	12	97	4	5		819	72	31	255	16	145		20	395
Florida		45	[7] 32	25	34	17		1	4	943	20	8	269	4	160	4		101
EAST SOUTH CENTRAL																		
Kentucky		34		59	2	19	4		11	15	1	7	181	22	24	2		180
Tennessee		48	2	36	35	79	43	6	9	5	161	16	257	23	192	1	4	397
Alabama		25		74	3				4		60	57	230	14	139		3	240
Mississippi				103	39	76		4		528		46	103	6		18		169
WEST SOUTH CENTRAL																		
Arkansas		10		34	48	254	246	1	3	1	203	147	155	7	92	1	1	150
Louisiana		9		27	245	3		1	1	97	12	5	49	4	143	2		240
Oklahoma		27		18	7	10	19	4	18		125	34	256	6	174	1	8	170
Texas		361		174	217	6,854	2,939	11				987	971	62	1,416	14		2,261
MOUNTAIN																		
Montana		171	6	5		6	2	2	54		29		306	3	72			18
Idaho		42	13	7	1	11	1		38		65		212		43			25
Wyoming		22		2					5				27	3	31			36
Colorado		127		7	4	26		32	49		120	2	275	17	152	1		130
New Mexico		27	1	8	15	17	13	1	7		4		120	1	26			97
Arizona		50		19	63	586	8	3	40		210		147	3	184	3		63
Utah		315		1	19		1		32		3		292	1	157			24
Nevada		20	21	1	2			1			11		16	4	1			3
PACIFIC																		
Washington		440	14	5	21	6	39		103		24		431	8	323			146
Oregon		349	6	1	18	35	145	2					423	2	238			133
California		1,746		100	61	154		15	530		45	10	1,495	47	3,481			[6] 308
Total	9	10,524	221	1,513	1,440	8,921	6,943	314	3,046	2,500	3,112	1,585	23,135	632	16,604	272	56	11,376
Third quarter 1948	5	12,362	179	1,740	1,269	7,109	4,042	226	1,781	2,799	5,888	4,067	40,449	618	18,471	323	230	11,086
Median 1944-48	12	13,421	179	2,918	1,044	7,109	4,042	289	2,151	3,479	11,782	15,899	19,452	829	14,969	335	1,007	13,044
Alaska		56		1					16		5		33		13			15
Territory of Hawaii		195	20	1	6	32			19	1	3	141	129	1	159			[6] 15
Panama Canal Zone [8]		68		12	21	17			2			243	8		4			[9] 59

See footnotes on p. 1624.

Consolidated monthly State morbidity reports for July, August, and September, 1949—Continued

Division and State	Polio-myelitis*	Rabies in man	Rheumatic fever	Rocky Mt. spotted fever	Scarlet fever*	Septic sore throat	Small pox*	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms*	Tuberculosis, respiratory	Tularemia	Typhoid fever*	Paratyphoid fever	Typhus fever, endemic	Undulant fever*	Vincent's infection	Whooping Cough*
NEW ENGLAND																			
Maine	357				31	10		1			122	102		3	1				123
New Hampshire	199				5	17					39						2	6	48
Vermont	101				20	2								1					39
Massachusetts	1,426				213	18		4	1	9	729	701		10	86		8		1,329
Rhode Island	127		6		10	12					135	128			1		1		43
Connecticut	437				36	64		5			327	300		13			5		421
MIDDLE ATLANTIC																			
New York	4,037			9	[10] 325	(11)		11		28	3,595	3,304	1	55	[12] 28	2	40		2,537
New Jersey	1,039			6	77	15		6		4	654		1	19	2		6		1,154
Pennsylvania	520		138	12	190			2		6	1,182		2	90	[13] 8	1	[15] 29		1,495
EAST NORTH CENTRAL																			
Ohio	1,427		21	5	339	5		5		13			4	73	13		40	2	1,091
Indiana	840		3	5	77	38		4		1	553	502	1	15	2		17	1	255
Illinois	2,320		63	8	155	84		11		1	2,147	2,013	6	44	2		116	22	1,497
Michigan	2,233		104		290	84		7	1		1,731		1	18	[12] 11	1	47		1,335
Wisconsin	837				98	18			1		578			1	1		44		1,050
WEST NORTH CENTRAL																			
Minnesota	1,461		25	1	73	17		2			585			7	[12] 8		74		39
Iowa	847			1	29						256		1		1		159		56
Missouri	1,077		1		49	2		3	159		624		26	45			51		75
North Dakota	399		1		15	1					62	55			1		13	4	38
South Dakota	273				14			1	10		99			3	1		14	2	13
Nebraska	463				[13] 135	(11)				1	90	35		7			13	1	30
Kansas	555		1	1	49	8					181	177	1	9			21	11	104
SOUTH ATLANTIC																			
Delaware	28			2	8						63	63		3			1		66
Maryland	158		18	23	43	9		5			637	615	3	17	1		16	1	400
District of Columbia	74			1	15			1		1				4	4				29
Virginia	235		2	67	114	514		5			845	823	15	49	13	2	26		327
West Virginia	264		10	3	77	34					637	633		39	1		3		203
North Carolina	137			55	209	2					819	779	8	23	1	12	10		370
South Carolina	63		18	4	24	198		5					6	22	5	6	5		50
Georgia	127		13	8	71	56		11			770	737	12	62	25	92	40	5	40
Florida	123				27	18		25	(7)		837		9	13	[12] 30	41	18	20	31

EAST SOUTH CENTRAL																			
Kentucky	475	1	5	12	157	28	2	3	29		587	581	2	64	7	2	14		331
Tennessee	386		28	13	169	41		7			1,492		7	75	10	8	11	30	384
Alabama	147			5	80			17			681		1	28	4	36	18		131
Mississippi	219	1	13	1	63			10			719	697	10	33	1	5	21		55
WEST SOUTH CENTRAL																			
Arkansas	715		1	8	35	468		5	25		535	527	60	62	2	7	11		257
Louisiana	136		10		25	4		12			754	726	4	52	15	40	9		17
Oklahoma	899		13	14	25	83		4	66		677	662	31	34	5		50	39	75
Texas	1,208			4	107	1,246			16		1,292		19	112	21	79	97		1,384
MOUNTAIN																			
Montana	65		1	2	20	20	1				131	130	6	6				4	29
Idaho	326		7	1	12	83	1	1	1		122		1	10	8		6	6	63
Wyoming	84		16	6	2						32	31	12	3	1		3	1	2
Colorado	505		23	6	41	121					826		2	12	7		31	21	99
New Mexico	124	1	15	1	16	6			5		[14] 276	[14] 264		21	1	1			33
Arizona	109		15		17	245		1	81		554	527		10			4		127
Utah	140		21	9	12	6					[14] 30	[14] 28	16	2	[13] 2		23	2	314
Nevada	12				2	24			2		9			1			1	6	48
PACIFIC																			
Washington	384		48		114	18		2			332		2	1	[12] 10		8	38	223
Oregon	134		18	1	43	53			2		174	159	5	5			11		326
California	1,402		161	1	288	47		20	6	7	2,186	2,043	3	38	228	3	34		1,482
Total	29,654	3	819	300	4,046	3,719	4	196	405	71	29,706	17,342	308	1,214	568	338	1,171	222	19,668
Third quarter 1948	16,678	8	899	308	5,659	4,673	9	206	744	114	33,484	19,511	267	1,054	341	423	1,423	254	13,114
Median 1944-48	13,530	9	[16] 842	303	8,887	2,051	33	154	372	86	32,577	18,076	286	1,349	353	1,357	1,423	484	30,308
Alaska			8			27					237	237		1					
Hawaii Territory	4		1		1	3		1		2	195	171		2		7	1		1
Panama Canal Zone [8]	4							3			[9] 8			3		6			[9] 16

Footnotes for table on pages 1620 to 1623

*On the basis of information in the latest compilation of the reportable diseases in the several States (Pub. Health Rep. 59: 317-340 (1944) Reprint 2544), diseases marked with an (*) are reportable by law or regulation in all States and the District of Columbia. Typhoid fever is reportable in all States, and paratyphoid fever in all but 6 States. A few States have begun to report paratyphoid fever as "salmonellosis." Syphilis is reportable in all States but is not included in the table, as more complete reports are issued later by the Division of Venereal Disease Control. Some States have increased and some have reduced the list of reportable diseases since the latest compilation cited above.

1 For first quarter report see Pub. Health Rep. 64: 927 (1949); second quarter, ibid.: p. 1306.

2 Includes cases of kerato- and suppurative conjunctivitis and of pink eye.

3 In a few States practically all cases contracted outside continental United States.

4 New York City only.

5 Exclusive of 6 cases of artifically induced malaria.

6 Lobar pneumonia only.

7 Corrected report from Florida states that the 20 cases of trachoma reported in that State January–June 1949 were conjunctivitis (Pub. Health Rep. 64: 930; ibid.: 1308).

8 Includes the cities of Colon and Panama.

9 In the Canal Zone only.

10 Includes septic sore throat.

11 Included in scarlet fever.

12 Includes cases reported as salmonella infections.

13 Reported as salmonella infections.

14 Includes nonresident cases.

15 Corrected report from Pennsylvania for the month of June 1949, reduces the total number of cases of undulant fever reported from that State for the second quarter of 1949 from 197 to 34 (see Pub. Health Rep. 64: 1308 (1949). This difference is due to erroneous report of 163 cases in Philadelphia for the month of June.

16 3-year median 1946–48.

The following list includes certain rare conditions, diseases of restricted geographical distribution, and those reportable in or reported by only a few States; last year's figures in parentheses (where no figures are given, no cases were reported last year, or the disease was not included in last year's published tabulation):

Actinomycosis: Pennsylvania 1, Michigan 1, Minnesota 1 (2), South Dakota 1.
Botulism: California 2.
Cancer: Pennsylvania 2,021, North Dakota 161 (231), Kansas 960 (981), South Carolina 110 (369), Georgia 73 (56), Florida 477 (451), Kentucky 10 (2), Tennessee 866 (643), Alabama 1,089 (1,013) Arkansas 233 (184), Louisiana 585 (648), Montana 445 (287), Idaho 142 (202), Wyoming 97, Utah 78 (65) includes nonresidents, Colorado 778, New Mexico 172 (184), Nevada 1.
Coccidioidomycosis: Arizona 28 (5), California 14 (19).
Colorado tick fever: Wyoming 3, Colorado 30 (15), Utah 2.
Dengue: South Carolina 2 (2), Georgia 1, Texas 2 (10).
Dermatitis: New Hampshire 4 (12), Missouri 9 (7), Kentucky 4 (41) mycotic dermatitis, New Mexico 8.
Diarrhea: New York 55, Pennsylvania 34 (58) includes gastroenteritis, Ohio 1,251 (738) includes enteritis, Indiana 2 (2) includes enteritis, Illinois 28 (16), Michigan 13 (24), Minnesota 22, Maryland 22 (10), West Virginia 1, South Carolina 889 (4,206), Florida 33 (36), Kentucky 13 includes gastroenteritis, Oklahoma 1 (1), Texas 1,609, Montana 1, Idaho 71 (13) includes gastroenteritis, Wyoming 1, New Mexico 131 (103), Nevada 42 (1) enteritis, Washington 1 (6), California 16 (8), Alaska 35 (6) includes enteritis.
Dog bite: Massachusetts 3,563 (3,723), Pennsylvania 1,909 all animal bites, Illinois 4,711 (5,221) all animal bites, Michigan 2,970 (3,432), Arkansas 160 (177) all animal bites.
Encephalitis, other forms: New York 1, Ohio 6 (1), Maryland 2 (5), Montana 2, Colorado 11 (4), New Mexico 1 (2), Washington 1.
Erysipelas: Vermont 1 (1), Connecticut 2 (4) Pennsylvania 7, Ohio 5 (10), Indiana 4 (2), Illinois 31 (17), Michigan 11 (12), Wisconsin 5 (5), Minnesota 1, Iowa 1, Missouri 3, Kansas 1 (2), Maryland 1 (4), Florida 3 (17), Tennessee 6 (11), Arkansas 4 (5), Louisiana 2 (3), Montana 5 (3) Idaho 1 (7), Wyoming 1, Colorado 2 (11), Washington 1 (2), Oregon 6 (9), Hawaii Territory 1 (4).
Favus: Kansas 1.
Food poisoning: New York 69 (161), New Jersey 5, Ohio 15, Indiana 10 (6), Illinois 38 (6), *Minnesota 3 (78)*, Iowa 13, *Oklahoma 14*, *Montana 2*, *Idaho 13 (6)*, New Mexico 2 (8), Washington 12 (12), Oregon 4 (5), California 44 (110).
Histoplasmosis: Minnesota 1, Tennessee 1.
Impetigo contagiosa: New York 21 (45), Ohio 146 (40), Indiana 13 (27), Illinois 3 (13), Michigan 193 (196), Missouri 8 (10), North Dakota 5 (17), Kansas 15 (11), Maryland 1 (2), Kentucky 15 (13), Montana 4 (4), Idaho 7 (4), Colorado 24 (5), Nevada 29 (41), Washington 161 (113), Alaska 5 (9), Hawaii Territory 6 (0).
Jaundice (including hepatitis and Weil's disease): Maine 3 (2), Connecticut 4 (1), New York 70 (35), Pennsylvania 104 (16), Indiana 1, Illinois 5 (3), Michigan 4 (4), Maryland 2 (2), Florida 2 (5), Kentucky 3 (13), Tennessee 14 (7), Montana 4 (2), Wyoming 6, Arizona 2, Nevada 1 (1), Washington 2 (3), Oregon 9 (5), California 56 (25), Panama Canal Zone 8 (5).
Lead poisoning: New Mexico 1.
Leprosy: New York City 3 (1), Minnesota 1, Texas 2 (4), Arizona 1, California 5 (2), Hawaii Territory 2 (4), Panama Canal Zone 3.
Lymphocytic choriomeningitis: Indiana 1, Minnesota 1 (1), Tennessee 9 (5) choriomeningitis undefined.
Mononucleosis: Connecticut 38 (27), Pennsylvania 1, Michigan 3 (11), Minnesota 118 (67), Maryland 1 (12), South Carolina 7, Kentucky 2 (1), Tennessee 9 (4), Oklahoma 1, Idaho 10 (3), Washington 6.
Plague (human): New Mexico 2.
Psittacosis: California 1 (1).
Puerperal septicemia: Pennsylvania 3, Mississippi 2 (1), Nevada 1.
"Q" fever: Arizona 1.
Rabies in animals. New York 155 (114), New Jersey 6, Ohio 96 (120), Indiana 133 (173), Illinois 7 (22), Michigan 38 (100), Wisconsin 3 (2), Minnesota 2 (2), Iowa 49 (8). Kansas 4 (5), Virginia 19 (35), South Carolina 37 (46), Georgia 87 (65), Florida 10 (26), Kentucky 96 (79), Alabama 71 (92), Arkansas 17 (15), Louisiana 11 (8), Oklahoma 30 (35), Texas 160 (245), Colorado 4, New Mexico 1, Arizona 3 (5), California 27 (44).
Rat-bite fever: Georgia 1.
Relapsing fever: Texas 9 (35), Nevada 1 (1), California 5 (4), Panama Canal Zone 2 (5).
Rickettsialpox: New York City 20 (52).
Ringworm (including ringworm of the scalp): Connecticut 26 (8), Ohio 42 (22), Indiana 5 (9), Illinois 53 (79), Michigan 162 (162), Minnesota 4 (12), Iowa 1, Missouri 1 (12), Kansas 1 (8), Virginia 47, South Carolina 4, Georgia 45, Kentucky 44 (17). Arkansas 1 (1), Oklahoma 5, Montana 1, Idaho 9 (11), Wyoming 1, Colorado 8, Utah 2 (4), Washington 142 (7), Oregon 33 (1).
Scabies: Ohio 14 (20), Michigan 94 (125), Missouri 3 (7), Kansas 2, Kentucky 24 (5), Montana 1 (15), Idaho 4 (9), Wyoming 5 (5), Nevada 2 (2).
Schistosomiasis: New York City 10 (1).
Silicosis: Arkansas 2 (1), Idaho 2, New Mexico 4 (7), Utah 1.
Yaws: Panama Canal Zone 8 (3).
Yellow fever: Panama Canal Zone 3 deaths.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 26, 1949

For the fourteenth consecutive week, total reported incidence of poliomyelitis in the Nation decreased over the preceding week. The total number of cases reported for the current week is 506 as compared with 735 last week, and 524 for the corresponding period last year. The 5-year (1944–48) median for the forty-seventh week is 229.

Thirty-five States reported an aggregate decrease of 286 cases of poliomyelitis, ranging from 1 in 5 States to 43 in New York. Ten States and the District of Columbia reported an aggregate increase of 57 cases, ranging from 1 case each in the District of Columbia and Delaware to 27 in Iowa. The figure for Iowa is the largest since the week ended October 1 when 56 cases were recorded. The total number of cases reported to date is 41,028 as compared with 26,215 for the corresponding week last year, and a 5-year median of 18,712.

No unusual incidence was reported in the Nation for the leading communicable diseases. One case of psittacosis was reported in California and one case of smallpox was reported in North Carolina. No cases of anthrax were reported. Diphtheria, influenza, measles, meningococcal meningitis, scarlet fever, typhoid fever, whooping cough, encephalitis, and tularemia decreased from the number reported last week. In addition, these diseases were below the 5-year median (1944–48) for the current week. Three cases of Rocky Mountain spotted fever were reported as compared with two cases last week.

Of 33 States reporting on rabies in animals, 17 reported no cases, while the remaining 16 reported a total of 87. The States reporting the largest numbers were Texas (22) and New York (13). The total to date is 5,103.

A total of 8,817 deaths was recorded during the week in 94 large cities in the United States, as compared with 9,874 last week; 8,557 and 8,987, respectively, for the corresponding weeks of 1948 and 1947; and 8,611 for the 3-year (1946–48) median. For the year to date the total is 429,906, as compared with 430,509 for the same period last year. Infant deaths for the current week totaled 615; for last week, 686, for the corresponding week last year, 599; and for the 3-year median, 650. The cumulative figure is 30,680 as compared with 31,282 for the same period last year.

Telegraphic case reports from State health officers for the week ended Nov. 26, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	-	-	-	54	-	15	6	-	3	-	-	-	17	-
New Hampshire	-	-	-	-	-	-	-	-	2	-	-	-	39	-
Vermont	-	-	-	-	-	-	-	-	7	-	-	-	10	-
Massachusetts	4	-	-	34	1	-	11	-	57	-	-	-	155	-
Rhode Island	-	-	-	1	-	5	8	-	4	-	-	-	9	-
Connecticut	-	-	-	10	-	29	14	-	11	-	-	-	110	-
MIDDLE ATLANTIC														
New York	7	2	-	68	2	176	55	-	[2] 70	-	-	3	242	13
New Jersey	-	-	4	28	6	37	14	-	20	-	-	1	130	-
Pennsylvania	4	-	-	41	8	60	13	-	49	-	-	2	176	1
EAST NORTH CENTRAL														
Ohio	8	-	-	25	-	65	25	-	118	-	-	4	109	8
Indiana	7	-	10	24	1	13	12	-	31	-	-	-	29	8
Illinois	-	-	5	22	4	70	27	-	35	-	4	3	58	3
Michigan [3]	1	1	-	155	1	29	32	-	57	-	-	1	178	4
Wisconsin	-	-	9	43	2	9	21	-	38	-	-	1	155	-
WEST NORTH CENTRAL														
Minnesota	2	-	-	21	2	12	13	-	20	-	-	-	1	-
Iowa	-	-	-	77	-	2	50	-	16	-	-	1	5	4
Missouri	4	-	-	5	2	29	1	-	11	-	-	6	11	-
North Dakota	-	1	12	7	-	-	1	-	6	-	-	-	3	-
South Dakota	-	-	-	9	-	-	3	-	2	-	-	-	8	-
Nebraska	-	-	8	18	-	1	5	-	10	-	-	-	-	-
Kansas	1	-	-	3	-	18	18	-	25	-	-	-	7	4
SOUTH ATLANTIC														
Delaware	-	-	-	1	-	-	1	-	1	-	-	-	4	-
Maryland [3]	1	1	1	12	1	32	2	1	12	-	1	-	26	-
District of Columbia	3	-	-	18	-	17	2	-	10	-	-	2	1	-
Virginia	7	-	129	8	1	50	2	-	37	-	-	3	6	1
West Virginia	6	-	21	7	-	3	-	-	11	-	-	-	5	-
North Carolina	15	1	-	41	1	-	3	-	97	1	-	1	64	-
South Carolina	11	-	11	7	-	7	4	-	11	-	-	-	6	2
Georgia	19	-	10	2	1	24	4	-	38	-	-	-	6	3

EAST SOUTH CENTRAL														
Kentucky	15		2	67	1	7	4		76		1	1	45	6
Tennessee	23		7	6	3	33	2		41				12	
Alabama	12		31		6	27	1		19			1	39	5
Mississippi [3]	18		7	13	2				11			2	2	
WEST SOUTH CENTRAL														
Arkansas	6		50	2		26	5		6			2	5	
Louisiana	12		1	4	1	29			3			2	5	
Oklahoma	3	1	54	1	2	21	15	1	14			1	9	
Texas	25	1	1,445	37	4	287	32		41		2	4	74	22
MOUNTAIN														
Montana			3	56			4		11				3	
Idaho			22	4	1	6	10	1	7				1	
Wyoming				3		3							2	
Colorado	3		20	21	1	12	10		7				10	2
New Mexico				14		6	2		2			1	1	
Arizona	2		113	18		13							18	
Utah [3]				69		2	2		4				4	
Nevada														
PACIFIC														
Washington	2			133	1	3	5		46				22	
Oregon	1		11	26		21	13		11				6	
California	10		4	68	3	25	50		71			3	76	
Total	240	8	1,997	1,286	58	1,229	506	3	1,183	1	9	46	1,904	
Median, 1944–48	396	9	2,167	1,936	74		229	2	2,011	5	21	59	2,111	
Year to date, 47 weeks	7,178	716	94,351	597,460	3,090	69,868	[4] 41,028	558	65,468	46	1,003	3,417	59,303	
Median, 1944–48	12,164	587	209,166	572,953	5,332		18,712	519	102,994	320	861	3,785	89,685	
Seasonal low week ends	(27th) July 9		(30th) July 30	(35th) Sept. 3	(37th) Sept. 17		(11th) Mar. 19		(32nd) Aug. 13	(35th) Sept. 3		(11th) Mar. 19	(39th) Oct. 1	
Since seasonal low week	3,410		18,484	8,942	574		[4] 40,113		10,208	5		2,957	12,701	
Median, 1944–45 to 1948–49 [5]	5,834		19,245	12,596	666		18,449		16,699	45		3,310	13,810	

[1] Including paratyphoid fever currently reported separately as follows: Michigan 1, Iowa 1, Alabama 1, Arkansas 1, Texas 1, California 3. Cases reported as salmonella infection not included in the table were as follows: Pennsylvania 1.
[2] Including cases reported as streptococcal sore throat.
[3] Period ended earlier than Saturday.
[4] Deduction: Michigan, week ended August 27, 1 case.
[5] The median of the 5 preceding corresponding periods (1944–45 to 1948–49).

Psittacosis: California 1 case.
Alaska: Measles 5, whooping cough 1.
Hawaii Territory: Influenza 246, measles 1.

DEATHS DURING WEEK ENDED NOV. 26, 1949

	Week ended Nov. 26, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,817	8,557
Median for 3 prior years	8,611	
Total deaths, first 47 weeks of year	429,906	430,509
Deaths under 1 year of age	615	599
Median for 3 prior years	650	
Deaths under 1 year of age, first 47 weeks of year	30,680	31,282
Data from industrial insurance companies:		
Policies in force	70,023,632	70,795,704
Number of death claims	10,854	9,907
Death claims per 1,000 policies in force, annual rate	8.1	7.3
Death claims per 1,000 policies, first 47 weeks of year, annual rate	9.1	9.2

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—Under date of November 18, 1949, plague infection was reported proved in 1 rat found dead three quarters of a mile west of Honakaa Village, Hamakua District, Island of Hawaii, on November 1, 1949.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended November 12, 1949.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox			17		135	207	42	16	61	60	538
Diphtheria					16	4					20
Dysentery:											
Amebic						1					1
Bacillary						2	1		1		4
Encephalitis, infectious							2				2
German measles					8	11			13	9	41
Influenza			17			9	2				28
Measles			82		137	43	65	89	49	231	696
Meningitis, meningococcal						1					1
Mumps			73		54	160	5	6	12	110	420
Poliomyelitis			1	2	3	4	3			2	15
Scarlet fever	7		3	3	30	30	15	1	44	19	152
Tuberculosis (all forms)	6		4	11	72	22	23	11		18	167
Typhoid and paratyphoid fever					6					2	8
Undulant fever					2					1	3
Venereal diseases:											
Gonorrhea	7		7	17	105	64	22	7	39	70	338
Syphilis	4		3	6	57	48	9	3	1	9	140
Whooping cough	1		37		88	47		8	2	5	188

NORWAY

Notifiable diseases—August 1949.—During the month of August 1949, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	13	Mumps	138
Diphtheria	24	Paratyphoid fever	3
Encephalitis, epidemic	5	Pneumonia (all forms)	1,159
Erysipelas	314	Poliomyelitis	21
Gastroenteritis	3,978	Rheumatic fever	102
Gonorrhea	355	Scabies	1,409
Hepatitis, epidemic	103	Scarlet fever	271
Impetigo contagiosa	2,271	Syphilis	57
Influenza	1,122	Tuberculosis (all forms)	269
Laryngitis	6,078	Typhoid fever	2
Malaria	3	Whooping cough	4,853
Measles	755		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note. The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Ceylon.—During the week ended November 19, 1949, 10 cases of cholera (suspected) with 2 deaths were reported in Eastern Province, Ceylon.

Plague

China—Chahar Province.—During the month of October 1949, 49 deaths from plague were reported in Chahar Province, China.

Ecuador—Loja Province.—During the period October 1–15, 1949, 1 fatal case of plague was reported at Cangonama Grande, Sozoranga Parish, Macara County, Loja Province, Ecuador.

Netherlands Indies—Java—Jogjakarta.—For the week ended November 12, 1949, 9 cases of plague, all fatal, were reported in the city of Jogjakarta, Java.

Union of South Africa—Cape Province.—During the week ended November 1, 1949, 1 case of plague was reported at Kamquip Farm in Gordonia District, Cape Province, Union of South Africa.

Smallpox

Algeria.—During the period October 1–20, 1949, 25 cases of smallpox were reported in Algeria.

Belgian Congo.—For the period October 9–29, 1949, 124 cases of smallpox (including *alastrim*) were reported in Belgian Congo.

Niger Territory.—During the period October 21–31, 1949, 100 cases of smallpox, with 11 deaths, were reported in Niger Territory.

Peru.—For the month of August 1949, 1,083 cases of smallpox were reported in Peru, of which 781 cases were reported in Cajamarca Department.

Typhus Fever

Ethiopia.—During the period September 6–26, 1949, 24 cases of typhus fever, with 3 deaths, were reported in Ethiopia.

Peru.—During the month of August 1949, 155 cases of typhus fever were reported in Peru, including 6 cases in Arequipa.

Yellow Fever

Brazil—Acre Territory.—On March 24, 1949, 1 death from yellow fever was reported in Feijo, Feijo County, Acre Territory, Brazil.

Peru—Cuzco Department.—On August 24, 1949, 1 death from yellow fever was reported in Quincemil, Cuzco Department, Peru.

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C.
Price 10 cents. Subscription price $4.00 a year

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Public Health Reports

VOLUME 64 DECEMBER 23, 1949 NUMBER 51

IN THIS ISSUE

Denver Rheumatic Fever Clinic

Public Health Service Publications

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
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CONTENTS

	Page
Denver rheumatic fever diagnostic service. Purpose and method of operation. Ward Darley	1631
Public Health Service publications, January–June 1949	1642
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended December 3, 1949	1649
Territories and possessions:	
Hawaii Territory—Plague (rodent)	1652
Puerto Rico—Notifiable diseases—4 weeks ended October 29, 1949	1652
Foreign reports:	
Canada—Provinces—Notifiable diseases—Week ended November 19, 1949	1652
Cuba—	
Habana—Notifiable diseases—4 weeks ended October 29, 1949	1653
Provinces—Notifiable diseases—4 weeks ended October 29, 1949	1653
Jamaica—Notifiable diseases—4 weeks ended October 29, 1949	1653
New Zealand—Notifiable diseases—4 weeks ended October 29, 1949	1653
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Plague	1654
Smallpox	1654
Typhus fever	1654
Deaths during week ended December 3, 1949	1654

Public Health Reports

Vol. 64 • DECEMBER 23, 1949 • *No. 51*

Denver Rheumatic Fever Diagnostic Service

Purpose and Method of Operation

By WARD DARLEY, M. D.*

Since many communities are giving serious consideration to the establishment of programs for the control of rheumatic fever and rheumatic heart disease,[1] a review of the development, organization, and operative methods of the Denver Rheumatic Fever Diagnostic Service may be of interest. In the 5 years in which this service has been in existence, countless problems have been encountered and solved. A description of the manner in which these difficulties were worked out may assist other communities in initiating and organizing similar services. This report discusses the purposes and policies, the origin, sponsorship, personnel, budget, and operational details of the Denver Rheumatic Fever Diagnostic Service.

As its name implies, the purpose of this activity is to provide a uniform diagnostic service to the physicians and people of the community. The service is not concerned with therapy but with identification of cases of rheumatic fever and rheumatic heart disease that have escaped detection. However, this does not mean that the service activities are of a survey nature as all individuals are referred to the clinic because of abnormal or questionable cardiac findings, neuro-skeleto-muscular pain, spontaneous nose bleeds, fever, tachycardia, weight loss, etc.—in other words, because they are suspected, for one reason or another, of having the disease. As would be expected congenital heart disease and other nonrheumatic conditions are frequently encountered. The service also is interested in evaluating previously recognized cases of rheumatic fever and rheumatic heart disease. Every effort is made to see that the children needing care or observation are returned to their physician. Arrangements are made for referral to a physician or clinic if there is no family

*Vice president, University of Colorado, and dean, Department of Medicine. The Denver Rheumatic Fever Diagnostic Service and the University of Colorado School of Medicine, Denver, cooperated in the preparation of this report.

[1] Wedum, Bernice, G.: Development of a community rheumatic fever program. Am. J. Pub. Health 8: 299 (1946).

doctor. In addition to these activities, the service acts as an educational center for undergraduate and graduate medical students and physicians in the community.

Organization

Community Cooperation

From the beginning, the organization, as well as operation, of the Denver Rheumatic Fever Diagnostic Service necessarily required the development and maintenance of community cooperation and local services. In September 1944 the service was initiated by the Denver Public Health Council, largely through the efforts of its president, Dr. Henry F. Hoffman. Arrangements for obtaining $2,500 for preliminary financing were made with the Denver Community Chest; an appropriation of $1,000 a month for support was allocated by the Denver Junior Community Chest. A special committee of the Denver Public Health Council directed the policies.

Through the combined efforts of the Denver Public Health Council, the city and county medical society, the public school system, and the University of Colorado, the Colorado Heart Association was organized in 1946. The association became a member of the Community Chest and assumed responsibility for direction of the diagnostic service in October 1947. Operation of the service and the source of financial support have remained unchanged.

The initial outlay for equipment was taken care of largely by the original grant of $2,500 made by the Denver Community Chest. Contributions of money, time, and services from various organizations [2] in the community have played an important part in equipping and maintaining the service. A fluoroscope was given to the school of medicine and added to the diagnostic facilities; a generous supply of books and toys was donated and a portable toy cart built for the toys by a lumber company; several community groups joined together to provide funds for mid-afternoon milk and sandwiches and for taxi fare for emergency transportation; nurses' aides helped to steer children through the clinic.

An important result of such active community participation in this program has been the value of the diagnostic service as an educational field for undergraduate and graduate students of medicine. Utilizing the clinical material of the service, the school of medicine

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[2] The following and other organizations have helped in innumerable ways: Colorado Division of the American Legion Auxiliary, Visiting Nurse Association, the Colorado chapter of the Alpha Phi National Sorority, the American Legion Child Welfare Committee, the Denver Chapter of the American Red Cross, the Women's Auxiliary of the Medical Society of the City and County of Denver, the Denver Junior League, the Faculty Wives of the University of Colorado School of Medicine, the Colorado Society for Crippled Children, the Colorado State Department of Education, the Colorado State Department of Vocational Rehabilitation, the Boettcher School for Crippled Children, the Barr Lumber Company, and the Volunteer Community Service.

has conducted formal postgraduate courses in the diagnosis and management of rheumatic fever and rheumatic heart disease. A postgraduate clinic which deals with the multiple phases of rheumatic fever and heart disease in children is held once a month. The service has provided excellent material for cardiovascular teaching because of the opportunity for appreciation and study of the wide range of normality as well as the great variety of rheumatic and congenital cardiovascular abnormalities that are inevitable in a large group of children selected as this one is.

In constant demand as speakers before the medical and lay groups of the community, staff members of the diagnostic service have a fine opportunity for professional and public education. Community interest in the work of the Denver Rheumatic Fever Diagnostic Service has resulted in generous contributions to the medical school for research in rheumatic fever and heart disease.[3] Personnel of the service have cooperated with the university and lay organizations in a survey of heart disease in the three counties of the State which lie above 9,500 feet in altitude. Another notable activity has been the organization by an energetic group of women [4] of a reprint and microfilm library. This work has been in process for 2 years. Eventually the library will contain either reprints or microfilm copies of all significant articles published since 1900 on the subject of rheumatic fever and rheumatic heart disease in the United States and foreign countries.

Personnel

The school of medicine of the University of Colorado provides the services of a dietitian, space, janitorial service, heat, and light. A member of the faculty acts as director and is responsible to the special committee of the sponsoring agency and not to the medical school. After the first 6 months his services have been on a voluntary basis. The director has no regular or stated duties. His function is one of over-all supervision—he is the liaison between the service and the supervising committee, the referring agencies or individuals, the medical profession, the press, and the general public. The half-time assistant director supervises the examination of new patients, dictates all clinical reports, makes it a point to check the histories, examine the hearts, and discuss the findings with the examining physician and medical students. In addition to the director and assistant director, the personnel includes a full-time secretary, a half-time social worker, a half-time technician, a half-time pediatrician, and a visiting clinician

[3] Delta Delta Delta Alliance, the Stardusters, and the Colorado Division of the American Legion Auxiliary

[4] Ladies Auxiliary of the Rocky Mountain Screen Club.

and nurse who attend all clinical sessions. Interested faculty members of the medical school always are present at the clinic sessions; residents, interns, and medical students are assigned regularly to the clinic. This personnel and the budget that follows has made it possible for the service to examine approximately 1,000 children a year.

Budget

The working budget for a typical year is as follows:

Assistant director	$3, 000
Pediatrician	1, 200
Visiting clinician	1, 200
Secretary	1, 884
Social worker	1, 620
Technician	784
Nurse	208
Incidentals	[1] 2, 104
Total	12, 000

[1] Incidental expenses include stationery, stamps, telephone, X-rays, miscellaneous supplies and a payment to the University of 50 cents for each admission (cost of laundry, electrocardiographic materials, etc.).

Operation

The management of patients, clinic operation, the record system, and diagnostic and referral procedures are described in detail as follows:

Referral Sources of Patients

The public schools of Denver routinely conduct an annual physical examination of all children whose parents have given consent. At any time during the school year, but usually during the yearly examination, the school physician or nurse may observe symptoms or physical findings indicating that the child may have rheumatic fever or heart disease. In all such cases the child's physician is consulted to ascertain whether or not he wishes the child referred to him or to the Denver Rheumatic Fever Diagnostic Service for evaluation. The Visiting Nurses Association provides health coverage for most of the parochial schools in Denver. The visiting nurse makes a referral to the service in the same manner as does the public school doctor or nurse. Practicing physicians frequently refer their patients to the service for evaluation and, while they may make telephone arrangements for such examinations, they are asked to send written consent with the patient at the time of the examination. Any agency (e. g., Public Welfare Department) other than the schools or private physicians may refer a child to the service, in which case the referral procedure is the same.

Procedures and Records

Consent or dissent for the routine school examination and the name of the family physician, if any, previously has been obtained from the parents of each child in the school system (figs. 1 and 2). If this examination, or developments at any other time, suggests the possibility of rheumatic fever or heart disease, machinery is set in motion to refer the child either to his family physician or to the diagnostic

Child's name.. JOHN DOE Age... 8

Address.. 816 Melrose Ave.

Grade.... 2 Section... A Home room... 102

Before we can make definite appointments with the school physician, we must know how many parents desire to avail themselves of this service for their children. Will you please fill out the coupon below and return to us, regardless of your decision. If you indicate that you desire the examination, you will be notified later of the time of your appointment. We should like to have one or both parents present at the examination.

Ellen Jones School Nurse

Franklin North Principal

PLEASE FILL OUT AND RETURN.

I desire the health examination for my child. Yes.. ✓

I expect to be present at the examination. Yes.. ✓

Mrs. Henry W. Doe Parent's signature

TIME OF YOUR APPOINTMENT

(To be filled out and sent to parents if they indicate that the health examination is desired.)

Name of child...... JOHN DOE

Health examination appointment: Day... January 25th

Hour... 10:30 AM

Ellen Jones School Nurse

Franklin North Principal

Figure 1.

Name *John Doe*

School *Carlton*

We should like to have in our records the name of your family physician.

Name: *Dr. John Brown*

If you do not have a family physician, will you check the following space? ☐

Parents Signature *Mrs. H. W. Doe*

Figure 2.

service. If the child has a physician, this physician is first contacted in order to ascertain his desires as to referral (figs. 3 and 4). When the family physician has been consulted and his instructions received, the school nurse gets in touch with the parents and makes recommendations which are in line with the physician's wishes. The procedure thus far is one that limits its concern to the school and the child's parents and physician. The completed forms that pertain thereto are kept on file with the school health service. In instances where the parents have indicated that the school child has no physician, the nurse deals directly with the parents and then, if they so desire, makes an appointment with the service. The school nurse (through the central office of the public schools) telephones the diagnostic service for an appointment and sends to the parents the perforated appointment card with time and date of the appointment properly filled in. The right side of this card, when completely filled in at the end of the examination, constitutes the master card for the service files (fig. 5). As part of the arrangements for the examination, the school nurse mails a form letter to the parents, confirming the appointment and giving directions and information concerning the examination procedures. This letter helps materially with the smooth operation of the service and with preparation of the patient and parents for the clinic visit (fig. 6). (In many cases where referral is not arranged by the public schools this form letter is mailed by the Rheumatic Fever Diagnostic Service.)

DENVER PUBLIC SCHOOLS
ADMINISTRATION BUILDING
414 FOURTEENTH STREET
DENVER 2 COLORADO
KENNETH E OBERHOLTZER SUPERINTENDENT

A L BEAGHLER, M D.
DIRECTOR OF HEALTH SERVICE

Dear Dr. John Brown

Undoubtedly you are familiar with the purposes of the Rheumatic Fever Diagnostic Service which has been established at Colorado General Hospital. The school health department is cooperating with this clinic in finding children who may have rheumatic fever. However, no child will be sent to the clinic without the approval of the family physician.

At a recent routine school health examination of John Doe the examining physician found what he believes are signs of a cardiac condition and/or evidence of possible rheumatic fever. Will you please indicate on the enclosed card whether you prefer to have this child referred to the Rheumatic Fever Diagnostic Service, or to your office. Please return the card to Dr. A. L. Beaghler, 414 Fourteenth Street, Denver.

Yours sincerely,

Ellen Jones, R.N
Carleton School Nurse

Figure 3.

Examination

No charge is made to any child—regardless of ability to pay. Clinic sessions are held twice weekly on Monday and Friday afternoons from 12:15 to 5. Each child who reports to the clinic is supposed to be accompanied by one of the parents or some other responsible person. However, this is not always possible in the case of children of high school age. Individuals over 19 years of age are not accepted. All new cases report at 12:15 p. m. and must have had lunch as they are expected to remain all afternoon. Since the examination requires

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Rheumatic Fever Diagnostic Service
Permission Slip

I wish my patient John Doe

to be referred to the Rheumatic Fever Diagnostic Service and then referred back to me (✓)

I wish my patient

to be referred directly to me ( )

Date March 3, 1948 Signed: John Brown, M.D.

Figure 4.

so much time from patients and parents, the availability of books, toys, and nourishment is important to their comfort. The few patients who may have occasion to pay more than one visit to the service because of unsatisfactory laboratory results or because of a recheck on some physical finding, report at 1:00. This permits service personnel to work to the best advantage, prevents confusion, and allows time for discussion between staff members and for the

Referral John Doe
from Mrs. A. Johnson (nurse)
School Carlton

Appointment
Day Monday
Date March 8, 1948
Time 12:15 P.M.

This card entitles you to admission.

Please Telephone
East 7771
Extension 290
if you cannot keep your appointment.

DENVER AREA RHEUMATIC FEVER DIAGNOSTIC SERVICE

Name John Doe — Age 8 — Date 3/8/48
Address 816 Melrose Avenue — Sex M
Race W
School Carlton — Grade 2 — Parents Mr. & Mrs. H.W. Doe — Phone Melrose 8244
Birthdate 2/20/40
Referred by physician / nurse ✓ / agency — Private Physician
Reason for Referral Possible Rheumatic Fever — Dr. John Brown

DO NOT WRITE BELOW THIS LINE

Diagnosis Rheumatic heart disease, active
Mitral Insufficiency
Disposition Private Physician

Figure 5.

March 1, 1948
(Date)

Dear Mrs. H. W Doe:

This letter will confirm the appointment made for John Doe on March 8th at the Rheumatic Fever Diagnostic Service. The office is located on the second floor of the Outpatient Building of the Colorado General Hospital, 9th Avenue and Colorado Boulevard.

In order to make the child coming for examination as comfortable as possible, please note the following instructions:

1. The child should eat lunch before coming to the Rheumatic Fever Clinic.

2. It is better for the child to miss school than to go without lunch.

3. If the child is a bed patient, take him or her to the Ambulance Entrance at the rear of Colorado General Hospital and ask that the child be brought to the Rheumatic Fever Clinic in a wheel chair.

4. Have the child at the Clinic promptly at 12:15 P.M. There is no advantage in coming earlier.

5. Be prepared to stay the entire afternoon.

6. The correct evaluation of the child's condition necessitates a great many questions. Please be prepared to help us to help you by giving as concise and exact answers as possible.

7. No charge of any kind will be made and within two weeks a complete report will be sent to the referring physician or agency. Your physician will discuss the report with you.

8. If you cannot keep this appointment, please call EAst 7771, Extension 290, or if you live outside Denver, drop us a card so that another appointment can be made.

Thank you for your cooperation.

Very truly,
(Miss) Mary Smith, Sec'y.
Rheumatic Fever Diagnostic Service

Figure 6.

teaching of visiting doctors, residents, interns, and medical students.

When the patient first reports to the Rheumatic Fever Diagnostic Service, the secretary fills in the top half of the detachable right side of the appointment card (fig. 5). The clinical chart is started and the child is taken by the nurse and technician for the following: weight, height, temperature, pulse rate (the unreliability of this under the the conditions of the examination is recognized), urine specimen, and venipuncture for blood, for hematocrit and serology. White and differential counts are obtained later if the examining physician indicates the need. After the patients complete the above procedures

they are taken to the heart station for electrocardiograms (standard limb leads). They are then returned to the service, where each child, together with a parent, is assigned to a medical student, intern, or resident for the clinical history and routine physical examination. The responsible attending staff is sufficiently large to check all student work thoroughly. The medical personnel, except for the assistant director, report to the service at 2 p. m. so that they are on duty at just about the time patients begin to return from the heart station. The assistant director is on hand at 12:30 to answer questions, do difficult venipunctures, take care of irregularities, and see any patients who have been asked to appear at 1 p. m. for some type of recheck. By 2 o'clock the assistant director usually is free to supervise the examination of new patients, who average about 10 per session. The assistant director also dictates clinical reports, checks histories, examines the hearts of all patients, and discusses the findings with the examining physician and students.

The clinical chart follows the patient throughout the examination, and all findings are recorded immediately on one of the seven sheets designed to include history, physical examination, laboratory tests, and follow-up. The dietitian and medical social worker interview parents for dietary and social histories (which are added to the clinical chart as soon as completed) during the frequent periods when the parents do not need to be with their children. After the patients finish with histories and physical examinations they are gathered in the fluoroscopic room. By 4 o'clock the medical staff usually is free so that the entire staff can witness the fluoroscopic examination of each child. The fluoroscopic findings are dictated to the secretary as each examination is done. The children are then allowed to dress and go home. X-ray examinations, if needed, are made the next day.

The recording of conclusions completes the study of each patient. The diagnosis is entered on the lower half of the master card (fig. 5), the report to the referring agency or physician is dictated, the master card is placed in the permanent file, and the clinical chart is sent to the medical school statistician for coding.

Since uniform examination is essential for the performance of satisfactory work, no apology is made for the use of forms or for the recording of history and clinical data.[5]

Reporting Results of Diagnostic Study

The complete report on all findings and conclusions of the diagnostic study, dictated by the assistant director, is returned to the referring agency. Two copies of this report (fig. 7, example of known

[5] A sample completed chart will gladly be sent upon request. Address Denver Rheumatic Fever Diagnostic Service, 4200 East Ninth Avenue, Denver 7, Colo.

THE DENVER RHEUMATIC FEVER DIAGNOSTIC SERVICE

UNIVERSITY OF COLORADO MEDICAL CENTER

4200 EAST NINTH AVENUE TELEPHONE EA 7771

DENVER 7 COLORADO

March 11, 1948

SPONSORED BY
COLORADO HEART ASSN
114—14TH ST

Dr. John Brown
Doctors Building
Denver, Colorado

Re: John Doe, Age 8
816 Melrose Avenue
Carlton Grade School

Dear Doctor Brown:

We have examined John Doe who was referred to us for diagnostic study on March 8, 1948.

In January 1948, the patient had an upper respiratory infection and sore throat followed in two weeks by fever and a measles-like rash, and later by "hives" which were always preceded by patterned, purplish-red blotches. He has also had stiffness and pain in the fingers, ankles, knees, and shoulders at varying times, relieved much by salicylates. At the time of hospitalization in February he had epistaxes, subcutaneous nodules. Later that month cardiac arrhythmia and precardial pain occurred. A cardiac murmur was heard for the first time on February 20, 1948. At present epistaxes, tachycardia, and rash occur. There is no history of rheumatic fever in the family.

On physical examination the patient was of the expected height and weight for his age, his temperature 100.6°, and his pulse 120. Over the back was a circivate, purplish-red, discrete and confluent rash. Blood-tinged crusts were present on the nasal septum. Arterial pulsations were felt in the suprasternal notch and capillary pulsations were seen in the nail-beds. The heart was slightly enlarged to the left on percussion with an apical systolic shock. The aortic second sound was equal to the pulmonic second sound in intensity. There was a high-pitched, blowing systolic murmur heard best in the left lateral position at the apex, transmitted to the axilla. There was a moderately loud diastolic murmur of medium pitch, blowing in quality, heard best at the second left interspace, transmitted into the neck and along the left sternal border. No change was noted with position or exertion. Also heard at the apex was a low-pitched, rough, presystolic murmur. The blood pressure was 140/40/0 and the femoral pulse was bounding.

The urine was negative for sugar and albumin but showed occasional red cells, mucus (3), pus cells (1), and epithelial squamous cells (2).

The electrocardiogram showed a rate of 120 with a PR interval of .17 and marked right axis deviation. The P waves were broad and notched and suggested auricular enlargement. The amount of right axis deviation suggested right heart strain. On fluoroscopic examination in the anterior posterior position the heart was hyperactive and moderately enlarged to the left. The waistline was widened. In the left anterior oblique position the heart does not clear the vertebral column on deep inspiration in a true lateral position. In the right anterior oblique position the pulmonary conus was slightly bulging but not remarkably so. There was slight posterior displacement of the barium filled esophagus.

An interview with the dietitian indicated that there were no deficiencies in his intake.

Our conclusion is that this patient has active rheumatic fever with rheumatic heart disease evidenced by aortic insufficiency, mitral insufficiency and mitral stenosis, with cardiac enlargement which is compensated at this time. We feel that the skin rash is an erythema multiforme, associated with his acute rheumatic fever.

Kindly let us know if we may be of further service to you.

Yours very truly,
Charles E. Lambert
Charles E. Lambert, M. D.
Director
George Q. Black
George Q. Black, M. D.
Assistant Director

L:B:W:

Figure 7.

rheumatic heart disease referred for evaluation) are sent routinely to the chief of the public school health service regardless of the referral source of the patient. One copy is for the school files as a duplicate master file and the other is for the school nurse. If the patient has been referred directly to the diagnostic service by a physician, the report is addressed to him and two carbon copies sent to the central office of the school system. If an agency other than the public school

system or a private physician refers the patient, the referring agency receives the original of the report and the school system receives the usual carbons.

While the Denver Rheumatic Fever Diagnostic Service does not treat patients, it frequently plays a part in directing to the proper place those patients needing treatment or observation. Patients referred by physicians or by schools (with the consent of physicians) always are referred back to their physicians. These physicians report to the parents and discuss with them the findings of the diagnostic study. Patients referred by agencies are referred back to the referring agency for disposition. Patients who do not have family physicians are referred to the office of the County Medical Society for physician referral unless they are indigents, in which case they usually are referred to the pediatric clinic of the University of Colorado School of Medicine.

It is hoped that this description of the Denver Rheumatic Fever Diagnostic Service may serve to ease the organizational work and benefit other communities planning to initiate a similar rheumatic fever program.

PUBLIC HEALTH SERVICE PUBLICATIONS

January–June 1949

The purpose of this list is to provide a complete and continuing record of Public Health Service publications for reference use by librarians, scientists, researchers and others interested in particular fields of public health work, and not to offer the publications for indiscriminate free distribution.

Single sample copies of most of the publications listed are available from the Public Inquiries Branch, Division of Public Health Methods, Public Health Service, Washington 25, D. C. Those marked with an asterisk (*) may be obtained by purchase only.

In general, quantities of each publication may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at the prices shown, with a reduction of 25 percent on orders of 100 or more of a single publication. However, the statistical reports of the National Office of Vital Statistics are not available from the Government Printing Office, and copies may be obtained only by writing to the National Office of Vital Statistics, Public Health Service, Washington 25, D. C.

PERIODICALS

*Public Health Reports (weekly), January–June, vol. 64, Nos. 1–25, pages 1 to 815. 10 cents a copy. Subscription price $4 a year.

*Extracts from Public Health Reports (monthly), January–June, Tuberculosis Control Issues Nos. 35 to 40. Average 30 pages each. 10 cents a copy. Subscription price $1 a year.

*The Journal of Venereal Disease Information (monthly), January–June, vol. 30, Nos. 1 to 6, pages 1 to 182. 10 cents a copy. Subscription price 75 cents a year.

*Journal of the National Cancer Institute (bimonthly), February–June, vol. 9, Nos. 4 to 6, pages 261 to 451. 40 cents a copy. Subscription price $2 a year.

Public Health Engineering Abstracts (monthly), January–June, vol. XXIX, Nos. 1 to 6, 32 pages each. No sales stock.

*Industrial Hygiene Newsletter (monthly), January–June, vol. 9, Nos. 1 to 6, 16 pages each. 10 cents a copy. Subscription price $1 a year.

National Negro Health News (quarterly), January–March; April–June, 1949 vol. 17, Nos. 1 and 2 (combined), 28 pages. No sales stock.

REPRINTS FROM PUBLIC HEALTH REPORTS

2911. Q fever studies in southern California. II. An epidemiological study of 300 cases. By M. Dorothy Beck, Joseph A. Bell, Ernest W. Shaw and Robert J. Huebner. January 14, 1949. 16 pages. 10 cents.

2912. Experimental animal colony in tropical West Africa. By Hildrus A. Poindexter. January 14, 1949. 6 pages. 5 cents.

2913. State legislation for minimum standards of hospital maintenance and operation. By Vane M. Hoge and John G. Steinle. January 21, 1949. 18 pages. 10 cents.

2914. Metopon hydrochloride. An experiment in clinical evaluation. By Nathan B. Eddy. January 28, 1949. 12 pages. 5 cents.

2915. Statistical studies of heart disease. III. Heart disease associated with other major causes of death as primary or contributory cause. By Mary Gover. January 28, 1949. 6 pages. 5 cents.

2916. A transparent dextrose serum tellurite plating medium. Its use as an adjunct to microscopic examination of smears made from Loeffler slants in routine diphtheria diagnosis. By Ona R. Whitley and Samuel R. Damon. February 18, 1949. 11 pages. 5 cents.

2917. A flocculation test as a possible method for differentiating immunologic types of the poliomyelitis virus. By E. C Roberts. February 18, 1949. 4 pages. 5 cents.

2918. Murine typhus fever in Louisville, Kentucky. By Newell E. Good and Emil Kotcher. February 25, 1949. 9 pages. 5 cents.

2919. Twenty-five year survival of a *Pasteurella pestis* culture without transfer. By Edward Francis. February 25, 1949. 4 pages. 5 cents.

2920. How the National Mental Health Act works By James V. Lowry. March 11, 1949. 10 pages. 5 cents.

2921. Prevalence of antibiotic-producing coliform organisms. By S. P. Halbert and M. Gravatt. March 11, 1949. 6 pages. 5 cents.

2922. Effect of smallpox vaccination on the outcome of pregnancy. By Marjorie T. Bellows, Mary E. Hyman, and Katharine K. Merritt. March 11, 1949. 5 pages. 5 cents.

2923. Relationship between infant mortality and socioeconomic factors in urban areas. By Marion E. Altenderfer and Beatrice Crowther. March 18, 1949. 9 pages. 5 cents.

2924. Effect of sodium fluoroacetate (1080) in poisoned rats on plague diagnosis procedures. Preliminary report. By I. Gratch, P. L. Purlia, and M. L. Martin. March 18, 1949. 4 pages. 5 cents.
2925. "Infection unit" and "index of aggregation" suggested epidemiological terms. By Filip C. Forsbeck. March 18, 1949. 5 pages. 5 cents.
2926. Statistical studies of heart disease. IV. Mortality from heart disease (all forms) related to geographic section and size of city. By Mary Gover April 8, 1949. 18 pages. 10 cents.
2927. Raffinose serum tellurite agar slants as a replacement for Loeffler's medium in diphtheria diagnosis. By Ona R. Whitley and Samuel R. Damon. April 8, 1949. 4 pages. 5 cents.
2928. Cobalt and the dust environment of the cemented tungsten carbide industry. By Lawrence T. Fairhall, Robert G. Keenan, and Hugh P. Brinton. April 15, 1949. 6 pages. 5 cents.
2929. Q fever studies in southern California. III. Effects of pasteurization on survival of *C. burneti* in naturally infected milk. By R. J. Huebner, W. L. Jellison, M. D. Beck, and F. P. Wilcox. April 22, 1949. 13 pages. 5 cents.
2930. Isolation of *Brucella abortus* from hogs. By Norman B. McCullough, Wesley C. Eisele, and Emma Pavelchek. April 29, 1949. 2 pages. 5 cents.
2931. Pertussis and aureomycin. By Joseph A. Bell, Margaret Pittman, and Byron J. Olson. May 13, 1949 10 pages. 5 cents.
2932. Simple and efficient transport method for gonorrheal specimens. By Lenore R. Peizer, Gustav I. Steffen, and Sarah Klein. May 13, 1949. 5 pages. 5 cents.
2933. Diarrheal disease control studies. II. Conical net for collecting flies. By Paul P. Maier and Richard P. Dow. 4 pages; 3 illustrations. 5 cents.
2934. Public Health Service publications July–December 1948. May 13, 1949 8 pages. 5 cents.
2935. Current organizational patterns of statistical activities in State health departments. By Daniel D. Swinney. May 20, 1949. 21 pages. 10 cents.
2936. Birth of a community mental health clinic. By Edward Davens and Paul Lemkau. May 27, 1949. 9 pages. 5 cents.
2937. Effects of DDT dusting on domestic rats under colony and field conditions. By Jack E. Dent, Harvey B. Morlan, and Elmer L. Hill. May 27, 1949. 6 pages. 5 cents.
2938. Avirulent isolate of *Salmonella typhosa* 58 (Panama carrier). By H. C. Batson, Maurice Landy, and Arthur Abrams. May 27, 1949. 4 pages. 5 cents.
2939. Summary of antimalarial drugs. By W. Clark Cooper. June 10, 1949. 16 pages. 10 cents.
2940. Professional education for cancer control. By Austin V. Deibert. National Cancer Institute program of postgraduate training for physicians. By R. R. Spencer. Cancer teaching in medical schools. By Raymond F. Kaiser. Cancer teaching in dental schools. By Raymond F. Kaiser. New tools for professional cancer education. By Cancer Reports Section, National Cancer Institute. June 17, 1949. 28 pages. 10 cents.
2941. Rabies problems and control. A nation-wide program. By James H. Steele and Ernest S. Tierkel. June 24, 1949. 12 pages. 5 cents.
2942. Pilot mental health clinic. First annual report of Prince Georges County Clinic. By Mabel Ross. June 24, 1949. 5 pages. 5 cents.
2943. Notifiable diseases, year 1948. June 24, 1949. 6 pages. 5 cents.

SUPPLEMENTS TO PUBLIC HEALTH REPORTS

180. Directory of State and territorial health authorities, 1949. (1949 revision.) 82 pages. 20 cents.
194. Directory of full-time local health officers, 1949. (1949 revision.) 47 pages. 15 cents.

PUBLIC HEALTH BULLETIN

301. Industrial hygiene problems in Bolivia, Peru and Chile. By J. J. Bloomfield. 1948. 139 pages; 15 illustrations. 40 cents.

NATIONAL INSTITUTES OF HEALTH BULLETIN

190. Phenol and its derivatives: The relation between their chemical constitution and their effect on the organism By W. F. von Oettingen. 1949. 408 pages 70 cents.

ANNUAL REPORT

Annual Report of the Public Health Service for the fiscal year 1948. 204 pages. 45 cents.

HEALTH INFORMATION SERIES

8. Poliomyelitis. 1949. 6-page folder. 5 cents; $1.50 per 100.
36. Influenza. 1949. 4-page folder. 5 cents; $1 per 100.
38. Chickenpox. 1949. 4-page folder. 5 cents; $1 per 100.

DENTAL POSTERS

1. Curb tooth decay the easy way. 1949. No sales stock.
2. 4×4=healthy teeth. 1949. No sales stock.

UNNUMBERED PUBLICATIONS

Interstate quarantine regulations. Part 72, title 42, code of Federal regulations amendment concerning lather brushes. January 19, 1949. 1 page. No sales stock.

The nurse in the U. S. Public Health Service. 1949. 21 pages, illustrated. 15 cents.

New discovery curbs tooth decay. 1949. 6-page folder, illustrated. 5 cents; $1.00 per 100.

Index to Public Health Reports, vol. 63, part I, January–June 1948. 31 pages. 10 cents.

Principles of sanitation applicable to the construction of new vessels. June 1, 1949. 101 pages. No sales stock.

REPRINTS FROM THE JOURNAL OF VENEREAL DISEASE INFORMATION

341. A macroflocculation spinal fluid test employing cardiolipin-lecithin antigen. By Arthur A. Rosenberg, Ad Harris, and Virginia L. Harding. December 1948. 4 pages. 5 cents.
342. Juvenile delinquency and venereal disease among public school children in Philadelphia. By Norman R. Ingraham, Jr. and Michael J. Burke. December 1948. 10 pages. 5 cents.
343. Results of therapy by race, sex, and stage of syphilis. By Theodore J. Bauer and Eleanor V. Price. January 1949. 8 pages. 5 cents.
344. Asexual syphilis in children. By Henry Eisenberg, Frederick Plotke, and Amelia H. Baker. January 1949. 4 pages. 5 cents.

345. Comparative studies on mailed spinal fluid specimens. By George R. Cannefax, George E. Parkhurst, and Richard W. Bowman. January 1949. 4 pages. 5 cents.
346. Integration of public health nursing into a Marine Hospital. By J. A. Trautman and Rosalie Giacomo. January 1949. 5 pages. 5 cents.
347. Problems of out-patient management of syphilis in the South. By John A. Lewis, Jr. January 1949. 4 pages. 5 cents.
348. Reports of the North Carolina syphilis studies. I. An evaluation of case-finding measures in syphilis control. By John J. Wright and Cecil G. Sheps. February 1949. 17 pages. 10 cents.
349. Fever-chemotherapy in early syphilis. By Jack Rodriquez, George X. Schwemlein, Theodore J. Bauer, Frederick Plotke, Erwin E. Peters, H. Worley Kendell, and Arthur A. Rodriquez. March 1949. 17 pages. 10 cents.
350. Penicillin in the treatment of syphilis in pregnancy. By H. N. Cole, Frederick Plotke, Evan W. Thomas, and Kenneth H. Jenkins. April 1949. 6 pages. 5 cents.
351. A quantitative turbidimetric method for the determination of spinal fluid protein. By Hilfred N. Bossak, Arthur A. Rosenberg, and Ad Harris. April 1949. 4 pages. 5 cents.
352. Preservation and inoculation studies on *Treponema pallidum*. By Charlotte McLeod and R. C. Arnold. April 1949. 4 pages. 5 cents.
353. Penicillin therapy of early syphilis: IV. By R. C. Arnold, J. F. Mahoney, F. P. Nicholson, and R. D. Wright. May 1949. 4 pages. 5 cents.
354. Venereal disease case-finding in Quitman County, Mississippi. By A. L. Gray, Howard Boone, and Richard S. Hibbets. May 1949. 4 pages. 5 cents.
355. Socioeconomic factors in syphilis prevalence, Savannah, Georgia. By C. D. Bowdoin, Clair A. Henderson, Warren T. Davis, Jr., John W. Morse, and Quentin R. Remein. May 1949. 9 pages. 5 cents.
356. Contact investigation of syphilis. By Joseph S. Spoto and Albert P. Iskrant. May 1949. 5 pages. 5 cents.
357. Sugar fermentations of gram-negative diplococci isolated from the genito-urinary tract of penicillin-treated gonorrhea patients. By Louis Wax. May 1949. 2 pages. 5 cents.
358. Stimulating venereal disease morbidity reporting by private physicians. I. Follow-up of positive serologic test reports. By Benson H. Sklar and Leonard M. Schuman. June 1949. 5 pages. 5 cents.
359. Syphilis contact investigation in a rural county in Mississippi. By A. L. Gray, Albert P. Iskrant and Richard S. Hibbets. June 1949. 4 pages. 5 cents.
360. A stable control serum for standardizing the sensitivity of tests used in the diagnosis and control of syphilis. By George R. Cannefax. June 1949. 6 pages. 5 cents.

VENEREAL DISEASE BULLETIN

100. Venereal disease clinics, 1948 directory. 1949. 112 pages. 25 cents.

REPRINTS FROM JOURNAL OF THE NATIONAL CANCER INSTITUTE

113. Distribution studies in mice following the intravenous injection of diethyl β-iodoethyl amine hydrochloride prepared with radioactive iodine. By Arnold M. Seligman, Alexander M. Rutenburg, and Orrie M. Friedman. February 1949. 10 pages. No sales stock.

114. Fibroids in a guinea pig (family 13) after partial castration. By Eli M. Nadel. February 1949. 5 pages; 4 illustrations. No sales stock.

115. Masculinizing ovarian tumor of adrenal type. By Edward J. Mortell. February 1949. 7 pages; 5 illustrations. No sales stock.

116. Some observations on the normal and pathologic anatomy of the kidney of the mouse. By Thelma B. Dunn. February 1949. 17 pages; 12 illustrations. No sales stock.

117. Aldolase in the serum and tissues of tumor-bearing animals. By John A. Sibley and Albert L. Lehninger. February 1949. 7 pages. No sales stock.

118. Cytological studies on the nature of the cytoplasmic particulates in the cloudman S91 mouse melanoma, the derived algire S91A partially amelanotic melanoma, and the Harding-Passey mouse melanoma. By M. W. Woods, H. G. duBuy, Dean Burk, and Marie L. Hesselbach. February 1949. 13 pages; 10 illustrations. No sales stock.

119. Enzymatic activities of isolated amelanotic and melanotic granules of mouse melanomas and a suggested relationship to mitochondria. By H. G. duBuy, M. W. Woods, Dean Burk, and Mary D. Lackey. February 1949. 12 pages; 4 illustrations. No sales stock.

120. Physicochemical studies of reversible and irreversible complexes of cobalt, histidine, and molecular oxygen. By John Z. Hearon, Dean Burk, and Arthur L. Schade. February 1949. 41 pages. No sales stock.

121. Blood histamine in leukemia and erythremia. By Michael B. Shimkin, Leo Sapirstein, Franz R. Goetzl, Priscilla M. Wheeler, and Nathaniel I. Berlin. April–June 1949 9 pages. No sales stock.

122. Dehydropeptidase activity in tumors. By Jesse P. Greenstein and Florence M. Leuthardt. April–June 1949. 2 pages. No sales stock.

123. Carbamates in the chemotherapy of leukemia. III. The relationship between chemical structure and anti-leukemic action of a series of urethan derivatives. By Howard E. Skipper and Carl E. Bryan. April–June 1949. 7 pages. No sales stock.

124. A study of the colon of apparently well women. By Marie Ortmayer and Marie Connelly. April–June 1949. 8 pages. No sales stock.

125. The effect of local roentgen irradiation on the biological behavior of a transplantable mouse carcinoma. I. Increased frequency of pulmonary metastasis. By Henry S. Kaplan and Edwin D. Murphy. April-June 1949. 7 pages; 5 illustrations. No sales stock

126. The histochemical demonstration of esterase. By Marvin M. Nachlas and Arnold M. Seligman. April–June 1949. 11 pages; 6 illustrations; 1 plate. No sales stock.

127. A new method for the histochemical demonstration of acid phosphatase. By Arnold M. Seligman and Leon H. Manheimer. April–June 1949. 8 pages; 4 illustrations; 1 plate. No sales stock.

128. Lipase activity during experimental epidermal carcinogenesis. By S. K. Kung. April-June 1949. 4 pages; 4 illustrations. No sales stock.

129. Some observations on the mitochondria of normal and neoplastic cells with the electron microscope. By A. J. Dalton, H. Kahler, M. G. Kelly, B. J. Lloyd, and M. J. Striebich. April–June 1949. 11 pages; 15 illustrations. No sales stock.

NATIONAL OFFICE OF VITAL STATISTICS PUBLICATIONS*

Current Mortality Analysis (monthly), vol. 6, Nos. 11 and 12, 1948; vol. 7, Nos. 1–3, 1949.

A List of Current Publications of the National Office of Vital Statistics. 5 pages.

Monthly Marriage Report (marriage licenses issued in major cities), vol. 2, Nos. 11–13, 1948; vol. 3, Nos. 1–4, 1949.

Monthly Vital Statistics Bulletin, vol. 11, Nos. 11–13, 1948; vol. 12, Nos. 1–4, 1949.

Quarterly Marriage Report (marriage licenses issued in the United States by State) vol. 3, Nos. 4 and 5, 1949 (discontinued).

Vital Statistics—Special Reports, vol. 29, National Summaries

No. 11. Stillbirths statistics: United States, each division and State, and 92 major cities, 1946. 143 to 154 pages.

No. 12. Maternal mortality by cause: United States, 1946. 155 to 160 pages.

No. 13. Deaths and death rates for selected causes by age, race, and sex: United States, 1946. 161 to 198 pages.

No. 14. Infant mortality from selected causes by age, race, and sex: United States, 1946. 199 to 232 pages.

No. 15. Accident fatalities in the United States, 1946. 233 to 252 pages.

No. 16. Motor vehicle accident fatalities: United States, 1946. 253 to 327 pages.

Vital Statistics—Special Reports, vol. 31, National Summaries

No. 1. Summary of mortality statistics: United States, 1947. 1 to 8 pages.

No. 2. Summary of natality statistics: United States, 1947. 9 to 18 pages.

No. 3. Deaths and death rates for each cause: United States, 1945–47. 19 to 38 pages.

Vital Statistics—Special Reports, vol. 28, State Summaries

Nos. 51–54. Hawaii, Puerto Rico, Virgin Islands, and Alaska, 1946. 923 to 992 pages.

Weekly Mortality Index, vol. 19, Nos. 53 and 54, 1948; vol. 20, Nos. 1–25, 1949.

*Not available from the Government Printing Office.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

---

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 3, 1949

For the fifteenth consecutive week the incidence of poliomyelitis in the Nation decreased from the preceding week. The total number of cases reported for the week is 434 as compared with 506 last week, and a 5-year (1944–48) median of 176. Twenty-three States and the District of Columbia reported an aggregate decrease of 163 cases, ranging from 1 case in 4 States to 15 and 32 cases in Texas and Iowa, respectively. Twenty States reported an aggregate increase of 91 cases, ranging from 1 in 3 States to 26 in Wisconsin. This State reported 47 cases for the week as compared with 21 for last week. The previous high for Wisconsin was 61 cases reported during the week ended October 8. The total number of poliomyelitis cases in the United States for the year to date is 41,461 as compared with 26,671 for the corresponding period last year.

During the week increases occurred in influenza, measles, meningitis, scarlet fever, tularemia, and whooping cough. However, these diseases remained below the 5-year median, except that of whooping cough which is only slightly above. Decreases from the figures last week may be noted in diphtheria (from 240 to 211) and encephalitis (from 8 to 4).

One case of smallpox was reported in Arizona. Four cases of anthrax were reported, three in New Mexico and one in New Jersey. No cases of Rocky Mountain spotted fever were reported.

Of 34 States reporting on rabies in animals, 15 reported no cases, while the remaining 19 reported a total of 114. The States reporting the largest numbers were New York (28), Kentucky (12), and Texas (12). The total number of rabies in animals reported to date is 5,217.

A total of 9,893 deaths was recorded during the week in 93 large cities in the United States, as compared with 8,798 last week; 9,667 and 10,102, respectively, for the corresponding weeks of 1948 and 1947; and 9,729 for the 3-year (1946–48) median. For the year to date the total is 438,109, as compared with 438,686 for the same period last year. Infant deaths for the current week totaled 685; for last week 608; for the corresponding week last year 703; and for the 3-year median, 723. The cumulative figure is 31,259 as compared with 31,873 for the same period last year.

Telegraphic case reports from State health officers for week ended December 3, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1			33		10	4		14				7	
New Hampshire									6				2	
Vermont									2				15	
Massachusetts	9			28	2		9		50			1	99	
Rhode Island						7	4		2				3	
Connecticut				17		46	3		12				146	
MIDDLE ATLANTIC														
New York	7		[2] 4	82	2	276	45		[3] 82		1	1	277	28
New Jersey	1		5	134	4	77	16		22				209	
Pennsylvania	5			58	3	83	7		61		1	1	205	1
EAST NORTH CENTRAL														
Ohio	13		2	18	5	45	15		144				38	7
Indiana	13		2	29	3	5	12		38		1	1	28	4
Illinois	1		2	23	9	95	15		49		3		92	1
Michigan [4]	5	1	2	234	2	43	34		88				195	1
Wisconsin	1		2	63	1	5	47		45				147	
WEST NORTH CENTRAL														
Minnesota	3			78	1	10	14		26			1	9	1
Iowa	3			79		2	18		18			2	5	4
Missouri				4	2	5	3		7			4	2	
North Dakota	9		1	41			1		4				1	
South Dakota		1		11			4		2					
Nebraska	3			2			11		5				3	
Kansas			19	4	1	27	6		19			1	16	3
SOUTH ATLANTIC														
Delaware	1			3					2				10	
Maryland [4]	5		1	17	1	27	8		24		1		50	
District of Columbia	2			29	1	15			3			1	1	
Virginia	12		238	12	2	68			32				39	1
West Virginia	4		20	102	2	6	3		29			1	19	
North Carolina	12			39	1		2		94			1	38	
South Carolina	6		20	10	1	17	1		15			1	1	4
Georgia	12	1	9	4	1	83	6		24		3	1	25	9
Florida	4		5	7	1	11	16		14		2			10

EAST SOUTH CENTRAL														
Kentucky	9			3	4	10	9		44				8	12
Tennessee	6		25	19	3	50	7		75			1	50	
Alabama	5		31	1	1	75			20			1	7	4
Mississippi [4]	10		3	20	1	19	3		12					
WEST SOUTH CENTRAL														
Arkansas	3		81	1		22	4		4		3	1	15	
Louisiana	7		2	16	2	28	4		4			1	5	
Oklahoma	8		51	3		26	17		10				6	2
Texas	18		1,486	43	10	320	17		26		2	4	78	12
MOUNTAIN														
Montana			1	40		1	1		10				4	
Idaho			6	5		6	4		8			1		
Wyoming						1	3					1		
Colorado	1		10	21	1	7	3		5			2	6	
New Mexico				5		6	4		10				14	
Arizona	2		79	38		16	1		5	1		1	23	9
Utah [4]	2			73	1	2	5		11				10	
Nevada														
PACIFIC														
Washington			22	97	1	3	3		67				37	
Oregon	3		6	22	1	16	8		11			1	12	
California	5	1	7	51	9	29	37		85			11	69	1
Total	211	4	2,142	1,619	79	1,599	434		1,340	1	17	42	2,026	
Median, 1944-48	329	8	2,492	2,277	81		176		1,787	2	30	53	2,022	
Year to date, 48 weeks	[5] 7,388	720	96,493	599,079	3,169	71,467	[5] 41,461	558	69,808	47	1,020	[5] 3,458	61,329	
Median, 1944-48	12,603	597	211,486	578,346	5,387		18,888	519	104,724	326	896	3,832	91,503	
Seasonal low, week ends	(27th) July 9		(30th) July 30	(35th) Sept. 3	(37th) Sept. 17		(11th) Mar. 19		(32d) Aug. 13	(35th) Sept. 3		(11th) Mar. 19	(39th) Oct. 1	
Since seasonal low week	[5] 3,620		20,626	10,561	653		[5] 40,546		11,548	6		[5] 2,998	14,727	
Median, 1944-45 to 1948-49 [6]	6,149		22,196	14,873	721		18,625		18,429	47		3,357	15,628	

[1] Including paratyphoid fever, currently reported separately, as follows: Alabama, 1; Texas, 1; Arizona, 1; California, 8. Cases reported as salmonella infection, not included in the table, were as follows: Massachusetts, 1; New York, 2; Pennsylvania, 1.

[2] New York City only.

[3] Including cases reported as streptococcal sore throat.

[4] Period ended earlier than Saturday.

[5] Deductions: Diphtheria—North Carolina, 1 case, week ended Nov. 26; poliomyelitis—Michigan, 1 case, week ended Nov. 5; Typhoid fever—North Carolina, 1 case, week ended Oct. 22.

[6] The median of the 5 preceding corresponding periods (1944-45 to 1948-49).

Anthrax: New Jersey, 1; Arizona, 3.
Alaska: Measles, 101.
Hawaii: Influenza, 323; whooping cough, 1.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—Under date of November 25, 1949, plague infection was reported proved, on November 3, in two rats found dead in Kukuihaele area, Honakaa, Hamakua District, Island of Hawaii, T. H., and under date of November 28, proved on November 7, in one rat found dead in the same area.

Puerto Rico

Notifiable diseases—4 weeks ended October 29, 1949.—Cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	1	Syphilis	42
Diphtheria	42	Tetanus	15
Dysentery	2	Tetanus, infantile	4
Gonorrhea	53	Tuberculosis (all forms)	342
Influenza	1,619	Typhoid fever	8
Malaria	12	Typhus fever (murine)	6
Measles	6	Whooping cough	82
Poliomyelitis	11		

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended November 19, 1949.—Cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1		28	10	232	303	120	72	106	112	984
Diphtheria					10			1			11
Dysentery, bacillary					6	1	4				11
Encephalitis, infectious							1	1			2
German measles			1		5	12		1	27	21	67
Influenza			54			9	5				68
Measles			56		189	89	107	163	58	253	915
Meningitis, meningococcal					1	2	2		1		6
Mumps			61		142	193	2	16	32	117	563
Poliomyelitis				1		1	5	11	2	1	21
Scarlet fever	10			3	81	40	38	11	25	23	231
Tuberculosis (all forms)	20		1	19	113	36	21	14		25	249
Typhoid and paratyphoid fever			2		2	1	1			2	8
Undulant fever			1		1	1	2			4	9
Venereal diseases:											
Gonorrhea	4		12	10	62	81	25	14	48	87	343
Syphilis	3		6	4	62	32	5	8	4	23	147
Whooping cough	1		1		158	46	4	6	3	11	230

CUBA

Habana—Notifiable diseases—4 weeks ended October 29, 1949.—Certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	2		Scarlet fever	1	
Diphtheria	24		Tuberculosis	11	2
Measles	2		Typhoid fever	8	1

Provinces—Notifiable diseases—4 weeks ended October 29, 1949.—Notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	5	8	11	35	2	28	89
Chickenpox		2					2
Diphtheria	1	25	2				28
Leprosy		4					4
Malaria	1	1	1		6	25	34
Measles		5				21	26
Scarlet fever		1					1
Tuberculosis	8	18	8	8	28	21	91
Typhoid fever	1	12	9	10	5	23	60
Whooping cough					1		1

[1] Includes the city of Habana.

JAMAICA

Notifiable diseases—4 weeks ended October 29, 1949.—Cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Leprosy		2
Chickenpox	1	7	Tuberculosis (pulmonary)	22	49
Diphtheria		3	Typhoid fever	2	49
Erysipelas	1		Typhus fever (murine)		1

NEW ZEALAND

Notifiable diseases—4 weeks ended October 29, 1949.—Certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	19	1	Ophthalmia neonatorum	2	
Diphtheria	9		Poliomyelitis	15	
Dysentery:			Puerperal fever	4	
Amebic	1		Scarlet fever	97	
Bacillary	22		Tetanus	2	1
Erysipelas	12		Tuberculosis (all forms)	186	50
Food poisoning	1		Typhoid fever	15	
Malaria	1		Undulant fever	8	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Belgian Congo—Costermansville Province.—On November 21, 1949, one fatal case of plague was reported in Vatondi, a village near Butembo, Costermansville Province, Belgian Congo.

Indochina (French)—Annam—Phanthiet.—During the week ended November 19, 1949, one fatal case of plague was reported in the port of Phanthiet, Annam, French Indochina.

Netherlands Indies—Java—Jogjakarta.—During the week ended November 19, 1949, 13 cases of plague were reported in the city of Jogjakarta, Java.

Smallpox

Arabia—Jedda and Mecca.—On November 14, 1949, two cases of smallpox were reported in Jedda, Arabia, and on November 20, six cases were reported in that port; on November 15, two cases were reported in Mecca. These cases were stated to have occurred in pilgrims.

Typhus Fever

Iraq—Mosul City.—During the week ended November 12, 1949, five cases of typhus fever were reported in Mosul City, Iraq.

DEATHS DURING WEEK ENDED DEC. 3, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Dec. 3, 1949	Corresponding week, 1948
Data for 93 large cities of the United States:		
Total deaths	9,893	9,667
Median for 3 prior years	9,729	
Total deaths, first 48 weeks of year	438,109	438,686
Deaths under 1 year of age	685	703
Median for 3 prior years	723	
Deaths under 1 year of age, first 48 weeks of year	31,259	31,873
Data from industrial insurance companies:		
Policies in force	70,006,436	70,788,933
Number of death claims	14,066	12,692
Death claims per 1,000 policies in force, annual rate	10.5	9.4
Death claims per 1,000 policies, first 48 weeks of year, annual rate	9.1	9.2

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

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Public Health Reports

VOLUME 64 **DECEMBER 30, 1949** NUMBER 52

IN THIS ISSUE

Community Mental Health Improvement Through Schools

Rat-bite Fever in Montana

Defects in the Sanitary Environment on Vessels

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY

Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE

Leonard A. Scheele, Surgeon General

Division of Public Health Methods

G. St. J. Perrott, Chief of Division

CONTENTS

	Page
A public health approach to improving community mental health through the schools. Charles A. Ullman	1655
Rat-bite fever in Montana. W. L. Jellison, Paul L. Eneboe, R. R. Parker and Lyndahl E. Hughes	1661
Defects in the sanitary environment on vessels. Ralph C. Graber and Arthur P. Miller	1666
INCIDENCE OF DISEASE	
United States:	
Reports from States for week ended December 10, 1949	1671
Communicable disease charts	1674
Territories and possessions:	
Hawaii Territory—Plague (rodent)	1675
Panama Canal Zone—Notifiable diseases—October 1949	1675
Deaths during week ended December 10, 1949	1675
Foreign reports:	
Finland—Notifiable diseases—October 1949	1676
Japan—Notifiable diseases—5 weeks ended October 29, 1949, and accumulated totals for the year to date	1676
Reports of cholera, plague, smallpox, typhus fever, and yellow fever received during the current week—	
Plague	1677
Smallpox	1677
Typhus fever	1677

Public Health Reports

Vol. 64 • DECEMBER 30, 1949 • *No. 52*

A Public Health Approach To Improving Community Mental Health Through the Schools

By CHARLES A. ULLMANN, Ed. D.*

The extension of public health methods to the field of mental health has reached a point where it is possible to demonstrate how our present and emerging knowledge of the conditions favoring sound mental health may be applied within the framework of existing community programs. This is a report of a project in which the goal of improved public health was approached through collaboration between the mental health clinic in a health department and a school system in providing better educational and general health services to children.

The primary function of this clinic is to develop methods by which communities may utilize resources within their grasp to improve the mental health of their members. Through offering service to children referred from the schools a need was discovered for the establishment in the community[1] of a remedial reading program for elementary school children. This field of education, in which the basic knowledge is relatively well known, appeared to be one in which particular application was needed. The project not only accomplished this tangible objective but set off a chain of events with desirable effects from a public mental health standpoint that extended beyond the immediate objective and created a pattern for coordinating activities of the clinic with those of other community agencies concerned with mental health. These activities are described in the final pages of this report.

The Reading Project

The reading project began when the principal of a public elementary school read in the newspaper about the establishment of the clinic and then asked the father of one of her pupils to apply for help for his boy. The father, a milk-routeman, telephoned the clinic for an appointment for his son. He was invited to come in alone first and discuss the problem, following which the boy would be seen.

Mr. B. was extremely concerned about his son's inability to read and expressed eagerness to do all he could to advance James. He and his wife had been aware of James' retardation in reading ever since the boy had been in the second grade—

*Clinical Psychologist, Prince Georges County (Maryland) Mental Health Clinic. This demonstration clinic is sponsored jointly by the Maryland Department of Health and the Public Health Service

[1] Prince Georges County, Md.

and he was now 12 years old and in the sixth grade. Mr. B. was critical of the school both for not teaching James to read and for promoting him to the sixth grade without being able to read. He was attempting to tutor James at home, but he disliked having to do this because it was upsetting to the family not to see results. He wanted assistance and had come to the clinic for it.

When James came to the clinic, he said almost at once that he could not read certain words. At school, the children and some of the teachers were annoyed with him because he could not read, and he said that sometimes the children laughed at him. When the children teased him about being unable to read, he fought with them and he did not have very many friends. He was willing to be helped in reading, but he showed no evidence of being convinced that anything could be done He knew that other people thought that he was very stupid and sometimes he himself thought so too.

Examination showed that James, although somewhat below average, had sufficient mental ability to read better than he actually did. He was lacking in independence of study methods. When blocked, he immediately asked for help. When given a word in the course of the examination, he retained it. The over-all picture was that of a beginning reader with a small stock of words he recognized at sight but who had no genuine reading techniques. Since the diagnostic reading examination gave no evidence that James was lacking in the abilities needed in learning to read if he were given instruction at his actual level of skill, a visit was paid to his classroom. It was learned that he was one of 311 pupils in a nine-teacher school. Generally, his reading was heard by a more capable member of his class after this pupil had finished his own studies. The teacher felt that James needed more individualized attention than she could afford with a class of nearly 40 and explained that she hoped the clinic could provide assistance. She added that if the clinic were successful in devising ways to meet James' problem she had two other pupils she would like to refer.

Under the circumstances the temptation was great to undertake the remedial training of James at the clinic. But it was felt that simply helping James and demonstrating the value of remedial reading for him was not the important objective at this time. The demonstration to be undertaken must be truly preventive and deal with the situation in which James' problem occurred. The task of providing for an adequate number of teachers and buildings to accommodate the swollen population of the county was not within the scope of the clinic. But the prospect of vacant classrooms over the vacation period suggested the possibility of summer reading classes. The problem and the possibility were therefore brought to the superintendent of schools who was also on the advisory board of the clinic. He immediately acknowledged the responsibility of the school for providing such educational services and undertook to present the problem with a plan to his board of education.

As a result of joint planning, the elementary schools were to canvass their classrooms to find children who presented reading difficulties and refer them to the clinic for diagnostic study and treatment planning. (Junior high schools operated remedial programs during the regular school year.) The board of education engaged two elementary

teachers for the special summer project and sponsored their attendance at a brief workshop between the close of the school term and the opening of summer school. In less than 6 weeks from the submission of the clinic proposal to the superintendent of schools, summer classes for 32 pupils began. Because of the examinations conducted in the clinic prior to the opening of summer school, the teachers were ready on the first day of school to begin the type of work each child needed.

The change in the children's reading skills as a result of 20 days of summer instruction, while generally in the direction of improvement, was nominal and a prologue to further change during the following school year. However, the change in attitudes toward school and reading, on the part of many children and parents, was an important and dramatic outcome. Upon entering the classroom, children went with increasing frequency to the library to read or look at books. They read most of the time when they were not working with the teacher. They asked to take books home, or they told of reading newspapers or comics at home, things which they had not done before Nervous mannerisms of some of the children appeared to subside. Parents of nearly half of the pupils came to school on their own initiative to observe the classes, and they were eager to learn how they as parents could help the children further. They told of the children's changed attitude and mentioned that the children insisted on coming to school even when they did not feel well.

In the school year following the summer session, the children were watched by the supervisor of the summer program through reports and conferences with principals and teachers who received the pupils. Classroom visits by the supervisor sought to conserve the gains of the summer by providing the new teacher with information and suggestions about further instruction of these children and by assuring the children of continued interest in their individual progress. A few children were again referred to the clinic for more thorough study than had been possible initially

In addition to the direct benefits to the children involved, certain long-range benefits accrued from this enterprise, and these were perhaps the most important outcomes. Some parents, who previously had been critical of the schools as they witnessed their children's accumulating experience of failure, began to express appreciation for this manifest attempt to understand and deal with the reading problem. Teachers of the regular session were encouraged in their efforts to meet children's reading needs as a result of the activity by supervisory personnel in the establishment and conduct of the project. During the following school year teachers in five schools began special-help programs in reading, and the curriculum reflected a generally renewed interest in and emphasis upon basic instruction in reading.

The board of education made plans for a summer remedial reading program to become a regular feature, and in the following summer the program was not only tripled in size but lengthened by 2 weeks.

Finally, the project demonstrated how the mental health clinic in a health department can approach the objective of improving the mental health of a community, not by assuming the responsibilities normally borne by the established institutions, but by integrating its activities with theirs and finding ways to enlarge the mental health implications of their services.

Coordinated Activities

This section describes the activities developed within the framework of the foregoing principle One of these was a study of the problem presented by slow-learning children in the schools. The referral of such children to the clinic by visiting teachers led to frequent recommendations in the reports sent out by the clinic that a special educational program be established to meet the needs of exceptionally slow learners. A small facility was in existence in one school, but this was most inadequate to fill the apparent need in the system as a whole. When the clinic made a general proposal to the superintendent of schools that the facilities be increased, he expressed an interest in undertaking a survey of the numbers and areas of greatest concentration of children who might require special educational provisions and he requested the assistance of the clinic in conducting such a survey. The clinic developed a survey blank for obtaining evidence from teachers on the characteristics and needs of each slow-learning child. Before the survey was completed, fiscal considerations indicated that the provision of special facilities for exceptionally slow learners would have to be delayed. It was decided, nevertheless, to use the results of the survey both as a means of inquiry into other needs of children, especially those needs that might be met without an increase in financial outlay, and as a possible means of direct service to the individual children surveyed.

In studying the survey blanks and in follow-up with teachers, it was observed in one school, for example, that although 25 percent of the children nominated as slow-learners were considered by their teachers to suffer from malnutrition, and although defects of vision, hearing, and speech were also ascribed to members of the slow-learning group, no teacher included correction of physical health factors as a primary recommendation in dealing with the slow-learning group. On closer study, wide variations were seen in the teachers' capacity to observe and provide for the physical and mental characteristics of children in their classes. Efforts by classroom teachers and principals to eliminate barriers to learning revealed diverse practices,

ranging from expert use of the school program and environment and an eager seeking of additional resources, to failure to utilize available knowledge of health status in promoting classroom learning, and display of mistaken understanding of the respective roles of the classroom teacher and of personnel providing specialized services. The observation of perhaps widest significance was this apparent failure on the part of classroom teachers to realize fully their role in providing for the flow of specialized services to children, such as those provided by the school-lunch supervisor, the nurses, and the visiting teachers. Even teachers who were reaching out for help appeared to be without knowledge of the procedures for meeting the needs of children with health problems. It appeared important therefore to undertake a clarification of the health obligations and opportunities of the classroom teacher and to restate her relationship to the various specialized services available to her.

Following discussion with a group which included the school health education supervisor and the supervising nurse in the county health department (which gave school-nursing services), a proposal was submitted to the superintendent of schools for the establishment of a committee composed of school instructional and supervisory personnel concerned with health, and of personnel from the health department, including the mental health clinic, for the purpose of developing a statement of the responsibilities, activities, and resources for the teacher and others concerned with the functioning of a health program. This statement was designed to cover such matters as health observation, maintenance of health records, prevention and correction of maladjustments through use of the school program and environment, and use of specialized services. Such a statement was regarded as a useful element in the orientation of new teachers and the in-service training of the present teaching staff, as well as in supervision and in the integration of the health education and health-services programs. The formation of such a committee was promptly authorized and its organization is under way.

This health project led to an increased awareness of the importance of eliminating the physical, intellectual, and emotional barriers to learning as part of any program of child guidance in the schools. When the time for planning the second summer of remedial reading arrived, it was used as a means not only of providing direct psychological services for some children on an individual basis as in the first summer, but for demonstrating a case conference procedure which integrated the efforts of the various specialists concerned with the health and welfare of the child in school.

Again a survey blank was devised, in this instance calling for information relating to pupils' reading, such as present reading ability,

characteristic mode of attack on unfamiliar words, visual and auditory symptoms, nutritional status, characteristic behavior, presence of special talents, learning difficulties of siblings, teacher's opinion of cause of reading deficiency, and teacher's recommendation for remedial action. One completed blank was submitted by the classroom teacher for each child whom she nominated for the remedial program. The data thus obtained, together with information available in the cumulative record folder and any data available in the records of the visiting teacher and public health nurse, formed the basis of a discussion of the child as a learner by a committee composed of the supervisor of elementary education, the principal, a public health nurse, a visiting teacher, the psychologist from the mental health clinic, and, when opportunity permitted, the classroom teacher concerned. A conference was held in each of the 30 schools where children were nominated and, in all, 367 children were considered.

Out of these discussions, various actions resulted: acceptance of children for the remedial reading program; conditional acceptance or deferral of decision pending further study by the principal, visiting teacher, public health nurse, mental health clinic and/or family physician; rejection for reading program together with suggestions for achieving adjustment through other resources.

This pooling of efforts not only brought together all available information about a child at a critical point in his education, but also provided a laboratory for working out some of the problems of professional relationship and for clarifying the roles of the teaching personnel and the specialists. The health education supervisor participated in a number of the discussions and the superintendent of schools, the assistant superintendent, the county health officer and the education supervisor of nurses also visited. Eight public health nurses, each of whom felt a responsibility for the health program of the schools in her territory, found a new means of reaching their objectives. Principals acquired a fuller appreciation of the nature of some problems which had been presented initially in terms of reading and they learned to make a discriminating use of the mental health clinic. Teachers found that their cumulative records took on a new importance and they later expressed themselves as disposed to make an even more effective contribution to the conferences in subsequent years. As channels for communication developed, new mental health problems in the schools were uncovered, particularly a need to study the various teaching and administrative devices for dealing with pupil "failure," and a pattern emerged whereby mental health values might be attained through enabling existing community services to do their work "the mental health way"

Rat-bite Fever in Montana

By W. L. Jellison, Ph. D.,* Paul L. Enlboe, M. D.,** R. R. Parker, Ph. D.,† and Lyndahl E. Hughes*

A clinical case of rat-bite fever in Montana, the first reported case in the Rocky Mountain region, and the demonstration of infection in a population of house mice with which the patient had contact are reported here.

Rat-bite fever is a widely distributed, infectious disease of rodents. It is most frequently communicated to man by the bite of rats, *Rattus* spp., occasionally by the bite of other rodents, and rarely by the bite of dogs, cats, or ferrets which presumably have become contaminated by eating infected rodents. The causative agent is *Spirillum minus* (Carter).

The clinical symptoms of rat-bite fever resemble in some respects another disease which follows the bite of rats and is called Haverhill fever, the infectious agent of which is *Streptobacillus moniliformis* Levaditi, Nicolau and Poincloux. No doubt many cases diagnosed clinically as rat-bite fever have, in fact, been Haverhill fever. Demonstration of the etiological agent is desirable for differential diagnosis of the two diseases.

Human infection is most frequently reported in India and Japan, but is also known in Europe, Canada, the United States, and other countries. In a review by Bayne-Jones (*1*) of the 81 cases that had been reported in the United States up to 1931, only 5 cases in which the diagnosis was confirmed by demonstration of the organism, *S. minus*, are recorded. All other cases were diagnosed on clinical evidence. Larson (*2*) cited 19 cases in which *S. minus* had been isolated and he reported the 20th case. Hull (*3*) states that only 110 cases had been reported in the United States up to 1941. These were scattered over 28 States. He also states, "The only large area from which no cases were reported was the sparsely populated Rocky Mountain region."

In none of the published literature available do the authors find a report of human infection attributed to the bite of a house mouse (*Mus musculus*). Spontaneous infection in the conspecific laboratory white mouse is cited by Francis (*4*) for the United States and by Hull (*3*) for India.

Case Report

On October 5, 1948, S. S., a white girl, aged 9, was bitten on a finger by a mouse which she found sick or injured in the yard at her

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farm home about 10 miles north of Bozeman, Mont. On October 12 her finger became swollen and painful; there were malaise and chilly sensations. She was first seen by a physician October 21. At that time her oral temperature was 103° F. Physical examination was negative except for a series of macules extending up the right arm to the axilla. The finger showed no ulceration or swelling. The macules varied in size from 0.5 to 2 centimeters in diameter and were not tender on pressure. She was given one dose of 300,000 units of penicillin aluminum monostearate intramuscularly, and 5 grains of sulfadiazine four times daily was prescribed.

The child was hospitalized for observation October 25. Her oral temperature was 101° F., pulse rate 110, red blood cells 3,790,000, white blood cells 6,400, hemoglobin 77 percent. A differential count showed 28 percent small lymphocytes, 3 percent monocytes, 68 percent polymorphonuclear leukocytes, and 1 percent stab cells. Macules were still present on the arm at this time. Urinalysis was negative. A blood specimen was sent to the Montana State Hygienic Laboratory for agglutination tests, including that for tularemia; the report on this specimen was negative. Sulfadiazine was discontinued, and she was given 5 grains of phenacetin every 4 hours and was discharged October 26.

During the next few days her oral temperature varied from 102° F. to 105° F. She had, however, no particular complaints except malaise.

She was again admitted to the hospital November 1. She did not appear acutely ill, and the macules were hardly noticeable. Temperature on admission was 104.4° F. (rectal) and laboratory studies showed red blood cells 3,630,000, white blood cells 11,650, hemoglobin 70 percent. A differential count showed 12 percent lymphocytes, 2 percent monocytes, and 86 percent polymorphonuclear leukocytes. Urinalysis was negative. A second blood specimen was taken and reported negative for tularemia by the State Hygienic Laboratory.

Because of a clinical diagnosis of tularemia, streptomycin therapy was started immediately with a dosage of 0.2 gram every 4 hours, parenterally. The first injection was given at 3 p. m. November 1. At 6 p. m. the rectal temperature was 103.4° F., at 10 p. m., 103.6° F., and at 2 a. m. it was 98° F. It did not thereafter rise above 99.4° F. rectally while the patient was in the hospital or during convalescence at home. After six doses of streptomycin, the interval between doses was increased to 6 hours. Treatment was continued for 4 days. The patient was discharged November 6.

A third blood specimen was taken March 30, 1949. This was reported negative for tularemia by both the State Hygienic Laboratory and the Rocky Mountain Laboratory. The former also reported

a negative Wassermann test. This reaction is reported by some workers to be positive in cases of rat-bite fever. Another portion of this specimen of serum was submitted April 1, 1949, through the National Institutes of Health to the Veterans' Administration Hospital, Washington, D. C., where an agglutination test was made for *Streptobacillus moniliformis*, the causative agent of Haverhill fever. This test was reported as negative.

In this case, the following clinical symptoms are more characteristic of rat-bite fever than of Haverhill fever: early induration of the initial lesion; adjacent lymphadenitis; absence of arthritis; and absence of petechial rash.

Field and Laboratory Study

On a suspicion that this illness might be rat-bite fever, one of us (Jellison) visited the farm home of the patient on March 10, 1949. The farm is located in a cultivated area of the Gallatin Valley 10 miles north of Bozeman on the Spring Hill road. Seventy-two snap traps were set in the barn and granary in the late afternoon and yielded 40 mice the following morning. All were the common house mouse, *Mus musculus* L. These were refrigerated to be taken to the Rocky Mountain Laboratory, part in dry ice and part in snow, since it was not known whether rat-bite fever infection in animal tissues would survive dry ice refrigeration.

Blood smears and impression smears of the liver, spleen, and heart muscle of 16 of the mice were stained [1] and examined. The heart-muscle smears of all 16 mice contained numerous organisms typical of *S. minus*, the spirilla appearing to be in the heart muscle and not in the blood. The other tissue smears were all negative.

The spleens of the remaining 24 mice were divided into 6 pools of 4 spleens each. Each pool was triturated in sterile saline, and the resulting suspension was injected into one white rat, one guinea pig, and four white mice. There was no febrile reaction in the guinea pigs during 22 days. Blood smears and heart-muscle impression smears made on the 60th day were negative. Blood smears from the white mice were examined on the 3d, 5th, 7th, 10th, and 18th days after injection. All smears were negative on the 3d, 5th, and 7th days. The four mice in one lot were positive on the 10th day, and one or more mice in three additional lots were positive on the 18th day. Two lots remained negative. No sign of illness was exhibited by these mice up to the 30th day. Organisms were found in the blood smear of

[1] The staining technique used was one employed routinely at this laboratory for blood and tissue smears One drop of Giemsa spirochaete stain (Hynson, Westcott, and Dunning, Inc) is added to 1 cc of distilled water, the slides are flooded with this diluted stain and after 20 minutes are drained and rinsed with pure acetone This technique has proved very satisfactory for thin films, thick films, and for tissue impression smears

only one of the six white rats when they were bled and discarded on the 18th day.

A second visit was made to this farm March 23–25, 1949, to obtain live house mice for experimental work and also to sample the wild mouse population near the farm buildings and in adjacent fields. The following animals were also taken in kill-traps, and heart impression smears were examined for *S. minus:* from the farm buildings and adjacent yard, 3 *M. musculus*, 11 *Peromyscus*, 9 *Microtus;* from an isolated granary one-fourth mile north of farm buildings, 3 *M. musculus*, 9 *Peromyscus*, 4 *Microtus;* and along the highway two miles south of the farm buildings, 2 *Peromyscus*, 6 *Microtus*. Organisms were demonstrated in two of the three house mice trapped in the farm buildings, but none were found in *Peromyscus* or *Microtus* from the immediate area. Organisms typical of *S. minus* were found in heart-muscle impression smears of one of four specimens of *Microtus* trapped at the isolated granary.

Discussion

A human case of rat-bite fever in California caused by the bite of a wild field mouse was reported by Reitzel, Haim, and Prindle (*5*). The diagnosis was confirmed by demonstration of *Spirillum minus* in inoculated animals. No identification of the mouse other than "wild field mouse" was given, and this may include any one of several genera of native mice. Another case diagnosed by clinical evidence of human infection from a mouse bite was reported by Jenkinson and Jordan (*6*). The kind of mouse was not designated.

In 1946, F. A. Humphreys [2] of the Laboratory of Hygiene, Kamloops, British Columbia, established a strain of infection in laboratory animals injected with the tissues of two house mice, *Mus musculus*. These mice were collected at Ladner, near Vancouver, British Columbia. The infection was identified as rat-bite fever and *Spirillum minus* was demonstrated in the blood of test animals by one of the authors of this paper (Hughes).

A case of rat-bite fever in southern Idaho in September 1937 has been reported to the writers by Dr. L. J. Peterson.[2] Infection was attributed to the bite of a wild mouse, and spirilla were observed in blood smears from the patient. The case report has not been published.

In the case reported here, the diagnosis of rat-bite fever was made too late to demonstrate the infectious agent in the patient's blood, lymph nodes, or initial lesion. The clinical history is consistent with rat-bite fever. The patient was bitten by a mouse (domestic rats, *Rattus* spp., are entirely absent from this section of Montana) near her home where at least three genera of mice, *Microtus*, *Mus*, and

[2] Information by correspondence.

Peromyscus, were present in and about the farm buildings. On the morning of August 4 the patient was shown three freshly trapped mice, representing these three genera, and without hesitation picked the specimen of *Mus* as resembling the mouse that had bitten her. *Spirillum minus* was demonstrated in heart-tissue smears of each of the 16 house mice, *M. musculus*, examined that were trapped in these buildings March 10, 1949. *S. minus* was also demonstrated in one field mouse, *Microtus* sp., which was trapped about one-fourth mile from the residence March 25, 1949. Numerous other local specimens of *Microtus* and *Peromyscus* were examined but were not found infected.

Summary

A case of rat-bite fever that occurred in the fall of 1948 in a 9-year-old girl living on a farm near Bozeman, Montana, is reported. Streptomycin therapy was initiated 19 days after onset; the patient's temperature became normal within 24 hours, and convalescence was uneventful. Infection apparently resulted from the bite of a mouse, probably a house mouse. *Spirillum minus* was demonstrated in heart-tissue smears of 16 house mice trapped in the farm buildings and in those of one field mouse trapped in a field one-fourth mile away.

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Defects in the Sanitary Environment on Vessels

By Ralph C. Graber, M. S., and Arthur P. Miller, C. E.*

Prior to the inception of the present program of the Division of Sanitation on May 26, 1945, the active interest of the Public Health Service in sanitation aboard vessels was limited; many environmental factors capable of having a serious impact on health were not receiving the emphasis they merited. After that date, the objectives were broadened (1) to aid in the exclusion of communicable diseases from the United States, (2) to assist in the elimination of the transmission of disease from one State to another, and (3) to help protect and promote the health and welfare of passengers and seamen by the production and maintenance of an environment aboard vessels free of defects detrimental to health.

The phases of sanitation receiving attention in the present program are those pertaining to the potable, wash, and sanitary water systems; plumbing and plumbing fixtures; disposal of solid and liquid wastes; food stowage, handling, preparation, and serving; insect and rodent control; swimming pools; heating, lighting, and ventilation; rat-proofing; and general sanitation.

Inspections of operating vessels are made at piers by field personnel working under the supervision of the regional offices of the Public Health Service. Experience has shown that a minimum of two inspections a year of each operating vessel is required to maintain a reasonably satisfactory environment, because the physical condition of ships, and often their operating personnel, are constantly changing. The philosophy pervading this program is similar to that of any other sound public health program. It is based, for the most part, upon voluntary participation of vessel owners, operators, and crew members in an educational approach to removing defects and improving the environment on any United States flag vessel.

In 1947, an evaluation was made of the character and number of detected infringements upon good sanitary practice that might contribute to the incidence of disease. This study was accomplished during October 1947 by reviewing the original inspection reports on file in the regional office, New York. These inspections had been completed between August 17, 1945, and October 24, 1947, at the ports of New York, Boston, and Philadelphia. Each inspection

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report was carefully studied and all infringements noted were tabulated. A record was also made of the type of vessel involved in each inspection, because the vessel type and its normal method of operation tend to bear upon the occurrence of certain items of nonconformance with accepted sanitary practices.

Because the present vessel sanitation program was in its infancy at the time of this study, many factors inherent in such a new activity tended to influence its accomplishments. The guiding materials or standards, for example, were in the early stages of development and therefore subject to frequent revision. In the main, personnel engaged in this program's field work were new, and difficulty was experienced in obtaining uniform interpretation of the standards. Relationships between the regional supervising personnel and the responsible officials within the maritime industry had not been firmly established. As the majority of the vessel companies during that time were operating ships leased to them by the United States Maritime Commission and had little responsibility for making permanent improvements on them, there were problems in arousing interest among the operators to act to remove any defects found in a vessel's sanitary environment.

Table 1

Type of vessel	Number of inspections	Number of defects detected		
		Structural (built-in)	Operational	Totals
Cargo—Liberty	740	2,919	11,414	14,333
Cargo—Victory	363	912	4,638	5,550
Cargo—C-1	200	437	2,272	2,709
Cargo—C-2	232	503	2,434	2,937
Cargo—C-3	89	210	938	1,148
All cargo vessels	1,624	4,981	21,696	26,677
Tankers—T-2 and T-3	215	794	2,675	3,469
All vessels	1,869	5,775	24,371	30,146

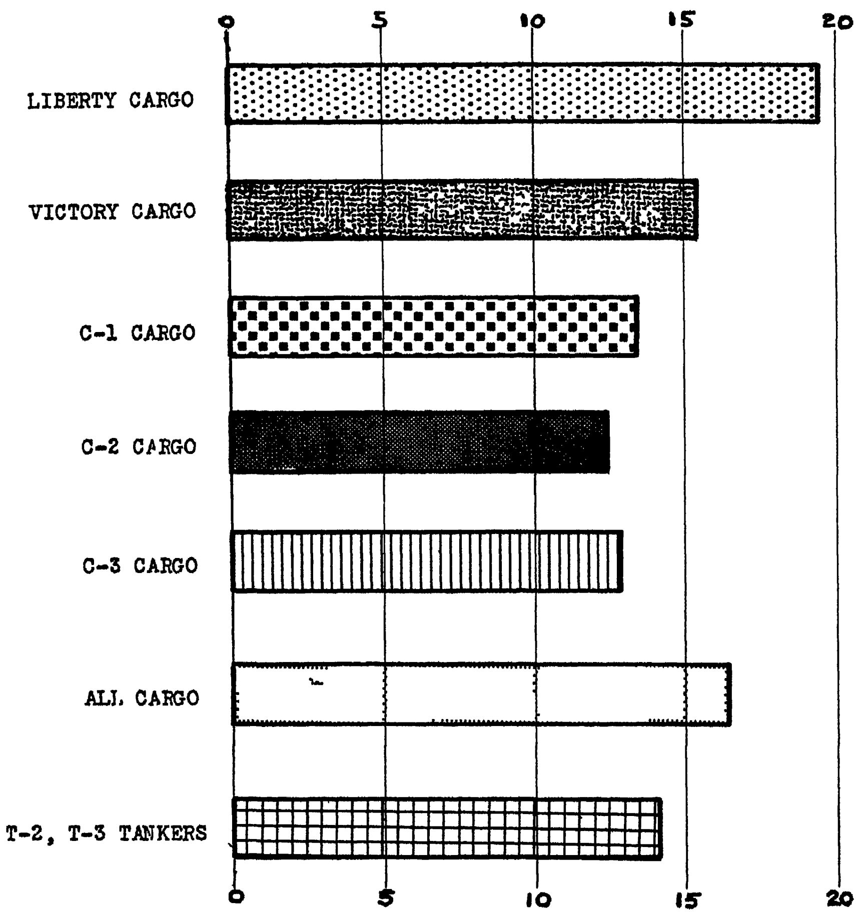
Table 2

Type of vessel	Average number of defects detected per vessel inspected		
	Structural (built-in)	Operational	Both
Cargo—Liberty	4.0	15.4	19.4
Cargo—Victory	2.5	12.8	15.3
Cargo—C-1	2.2	11.4	13.5
Cargo—C-2	2.2	10.5	12.7
Cargo—C-3	2.4	10.5	12.9
All cargo vessels	3.1	13.4	16.4
Tankers—T-2 and T-3	3.2	10.9	14.2

The detected infringements found by this study have been divided into (1) those that were built into vessels during their construction, and (2) those resulting from imperfect operation and maintenance. The data have also been summarized according to the type of vessel inspected. Table 1 shows the gross number of defects or infringements detected.

Another comparison is made in table 2 to show the average number of detected defects per vessel inspected.

The chart illustrates the comparative averages of the numbers of detected defects on the various types of cargo vessels and compares the weighted average number found on all cargo vessels and the average number found on tanker vessels. The additional 2 2 defects



Average number of defects detected per vessel inspected.

found on cargo vessels when compared to tankers may be due to the fact that the construction of cargo vessels necessarily includes many more potential rat harborages with a corresponding increase in the number of possible ratproofing defects.

Table 3 contains data on the occurrence of a selected but representative group of items of nonconformance with recommended sanitary practices. These data were also divided to indicate the difference of item occurrence with relation to the type of vessel.

Table 3

Nature of defect	Percent of indicated type of vessel on which selected defects were detected					
	Cargo					Tankers
	Liberty	Victory	C-1	C-2	C-3	T-2 and T-3
Structural (built-in)						
Absence of approvable drinking fountains	15.1	8.8	4.5	7.8	6.7	33.0
Charcoal filter used on distilled water discharge line	67.5	0	0	0	0	5.3
Nonpotable water improperly piped into hospital space	51.4	1.9	0.5	0.4	4.5	24.1
Nonpotable water piped to improper location in galley	21.0	12.7	10.0	19.0	15.7	39.1
Absence of multiple-vat sink for utensil washing	4.2	30.1	23.5	11.2	36.0	47.7
No indicating thermometer for utensil rinse water	84.9	83.1	88.5	85.0	88.6	46.1
Potable water outlets without air gaps	11.4	14.9	24.5	13.8	12.5	11.5
Deck storage boxes not ratproofed	21.0	9.1	9.5	10.8	4.5	5.3
Operational						
Potable water system not identified	84.3	56.7	65.0	55.6	48.3	64.0
Cross connection at potable water pump suction	15.4	11.3	17.0	14.2	10.1	0
Cross connection at distilled water discharge	63.0	49.3	44.0	18.1	21.4	35.9
Garbage improperly stowed in galley	61.8	63.6	58.0	55.1	61.8	69.4
Garbage improperly stowed on deck	67.2	66.7	49.5	50.4	55.1	26.1
No baskets available for bactericidal treatment of dishes	91.2	88.8	84.5	84.9	81.9	82.0
Rinse water for utensils not maintained at 170° F	90.6	89.5	85.0	84.0	84.3	81.6
No signs warning food handlers to wash hands	89.6	85.1	83.0	78.9	87.6	81.2
Potable water distribution system cross-connected	57.5	37.5	41.5	27.6	24.7	37.6
Decks in food spaces not clean	36.1	28.1	21.5	23.3	15.7	21.
Breaks or holes in bulkheads or deckheads (ratproofing)	13.7	10.2	3.0	3.4	2.2	4.1

With exceptions, there is some consistency in the percentages of various types of vessels showing the presence of the selected, representative defects. This is more applicable to those items related to human error, i. e., operational, than to those of a structural nature. An example of this consistency is the improper stowage of garbage in the galley, a defect readily remedied by an improvement in housekeeping procedures. The more extreme variations in percentages may be attributable to differences in the construction of certain features on the types of inspected vessels. For example, multiple-vat sinks for utensil washing were more consistently built into the Liberty and C-2 types than the other types of cargo carriers. On the other hand, even though comparatively few Liberty type vessels were not satisfactorily

equipped to accomplish the bactericidal treatment of multi-use eating and drinking utensils, it is evident from table 3 that such treatment was not being provided adequately.

Much remains to be done by all concerned and interested to produce a sanitary environment on many vessels. Not only must adequate facilities be provided by building them into a ship during construction or major repair, but, of greater significance, the proper and satisfactory use of the adequate facilities must be obtained. The maritime industry is showing a greater awareness of the need to provide good and adequate facilities and to bring about their use to the greatest advantage. As the human element is involved, particularly in the satisfactory use of appropriate equipment when it is supplied, accomplishment must depend largely upon education. But through cooperation and education, the objectives of the program will be attained and thereby benefits of a permanent nature will accrue to the vessels of our merchant marine.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 10, 1949

The decline in reported cases of poliomyelitis has been almost as steep as the increase. The low week of the calendar year was April 9 when 41 cases were reported. The rise in cases reported since then has been steady, passing 100 cases on May 21, and reaching the peak 19 weeks later on August 20, when 3,420 cases were reported. For the current week ended December 10, 322 cases of poliomyelitis were reported. This is the sixteenth consecutive weekly decline in poliomyelitis since the peak. However, in spite of this continuous increase, the week's total is higher than the 5-year median (1944–48) of 168 cases. The cumulative total for 49 weeks of 1949 is 41,783, as compared with 27,016 for the same period of the preceding year and 19,021 for the 5-year median.

The geographic distribution of cases for the 49-week period with percentages for the current year and the preceding year is as follows:

	1949, 49 weeks		*1948, 49 weeks*	
	Number	*Percent of total*	*Number*	*Percent of total*
New England	3, 406	8.2	401	1.5
Middle Atlantic	7, 875	18.9	2, 997	11.1
East North Central	9, 752	23.3	4, 053	15.0
West North Central	6, 662	15.9	4, 950	18.3
South Atlantic	1, 978	4.7	4, 516	16.7
East South Central	1, 813	4.3	949	3.5
West South Central	4, 827	11.6	2, 400	8.9
Mountain	2, 043	4.9	830	3.1
Pacific	3, 427	8.2	5, 920	21.9

All other notifiable diseases showed little change from the preceding week. The reported incidence for the following diseases increased over the preceding week but remained below the 5-year (1944–48) median.

Disease	*Current week*	*Last week*	*Median*
Influenza	2, 554	2, 142	2, 813
Measles	2, 009	1, 619	2, 787
Scarlet fever	1, 461	1, 340	2, 161
Tularemia	22	15	35
Whooping cough	2, 227	2, 026	2, 252

Diphtheria decreased from 211 cases last week to 209 for the current week and meningococcal meningitis dropped from 79 to 56 cases for the current week. One case of smallpox was reported in Arizona.

Telegraphic case reports from State health officers, for the week ended December 10, 1949

[Leaders indicate that no cases were reported]

Division and State	Diptheria	Enceph-alitis, in-fectious	Influenza	Measles	Menin-gitis-menin-gococcal	Pneu-monia	Polio-myelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tulare-mia	Typhoid and para-typhoid fever [1]	Whoop-ing cough	Rabies in animals
NEW ENGLAND														
Maine				50		11			6			1	9	
New Hampshire			1	2		2			2				4	
Vermont				1										
Massachusetts	1			44			8		64				133	
Rhode Island						6			11				25	
Connecticut	1			27	1	60	10		12				82	
MIDDLE ATLANTIC														
New York	10		[2] 1	97	4	232	40		[3] 60		1		301	9
New Jersey	2		3	111	1	80	11		19				205	
Pennsylvania	3			55	4	64	9		58		1		197	2
EAST NORTH CENTRAL														
Ohio	11		3	26		47	5		184		2	2	150	5
Indiana	7	1		25		8	11		57		3	2	20	15
Illinois	1	5	1	44	4	90	11		42		5	2	118	
Michigan [4]	3	2	2	424	3	34	32		130			2	222	9
Wisconsin	1		3	48	3	7	12		38				175	1
WEST NORTH CENTRAL														
Minnesota	8			95	2	30	7		24				6	
Iowa	3		80	67		2	13		28				7	2
Missouri	3		3	5	2	33	3		21		3	4	23	
North Dakota	1		20	33			1							
South Dakota				1		1	2		3				3	
Nebraska	1		31	17		8	7		11				2	
Kansas			2	6		32	2		16			1	19	2
SOUTH ATLANTIC														
Delaware				6	1				5			1	8	
Maryland [4]			6	11		42	3		18			1	62	
District of Columbia	2			33		9			3			1	14	
Virginia	7		237	16		66	3		36			1	32	1
West Virginia	2		25	49	1	20	3		23		3	1	18	12
North Carolina	12			55	2		2		88				35	
South Carolina	13		25	9	1	12			4				1	7
Georgia	14		9	5	1	10	4		16				1	8
Florida	7		17	5		13			15			1	2	

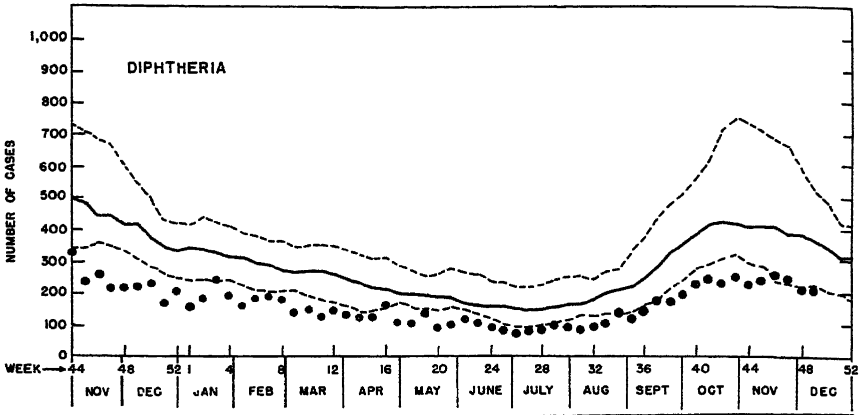
EAST SOUTH CENTRAL														
Kentucky	7			7	4	15	5		51			1	8	15
Tennessee	20		23	9		53	1		47		2	2	26	5
Alabama	8		72	19	1	75	3		22			1	6	9
Mississippi [4]	5		15	13	2	17	4		13			2	3	
WEST SOUTH CENTRAL														
Arkansas	7		62	2	1	53	4		3				5	
Louisiana	3		2	5	2	33			5			2	1	
Oklahoma	4		81	3		35	5		24			4	12	2
Texas	24	2	1,666	40	5	281	16		37			4	86	22
MOUNTAIN														
Montana	1		9	92			1		8		2			
Idaho			6	4		6	4		9				1	
Wyoming				2	1	1	2						3	
Colorado			18	42	1	14	7		13			2	17	
New Mexico				43		1			6				35	
Arizona	3		106	52	2	11	1		16	1			26	
Utah [4]	1		2	68	1	3	3		14				8	
Nevada														
PACIFIC														
Washington			8	138	1	2	7		77				24	
Oregon	2		7	19		28	4		16				12	
California	5	1	8	78	5	35	56		100			9	80	
Total	209	11	2,554	2,009	56	1,582	322		1,461	1	22	47	2,227	
Median, 1944-48	415	8	2,813	2,787	77		168	1	2,161	4	35	52	2,252	
Year to date, 49 weeks	7,597	731	99,047	601,088	3,225	73,049	41,783	558	71,269	48	[5] 1,040	[5] 3,507	63,556	
Median, 1944-48	13,018	605	214,299	584,626	5,465		19,021	519	106,885	327	931	3,876	93,755	
Seasonal low week ends	(27th) July 9		(30th) July 30	(35th) Sept 3	(37th) Sept. 17		(11th) Mar. 19		(32d) Aug. 13	(35th) Sept. 3		(11th) Mar. 19	(39th) Oct. 1	
Since seasonal low week	3,829		23,180	12,570	709		40,868		13,009	7		[5] 3,047	16,954	
Median, 1944-45 to 1948-49 [6]	6,550		25,204	18,238	799		18,758		20,590	48		3,401	17,880	

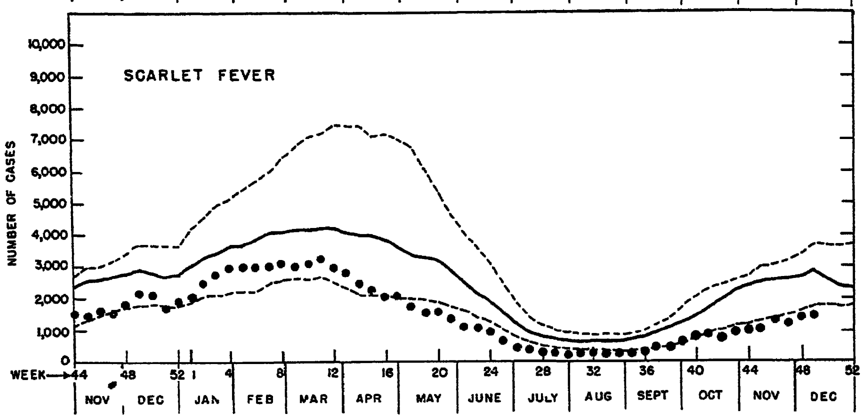
[1] Including paratyphoid fever currently reported separately as follows: Ohio 1, Indiana 1, Texas 1, Colorado 1, California 9. Cases reported as salmonella infection not included in the table were as follows: Massachusetts 2, New York 2.
[2] New York City only.
[3] Including cases reported as streptococcal sore throat.
[4] Period ended earlier than Saturday.
[5] Correction for week ended December 3; Florida, 2 cases of typhoid fever instead of tularemia.
[6] The median of the 5 preceding corresponding periods (1944-45 to 1948-49).

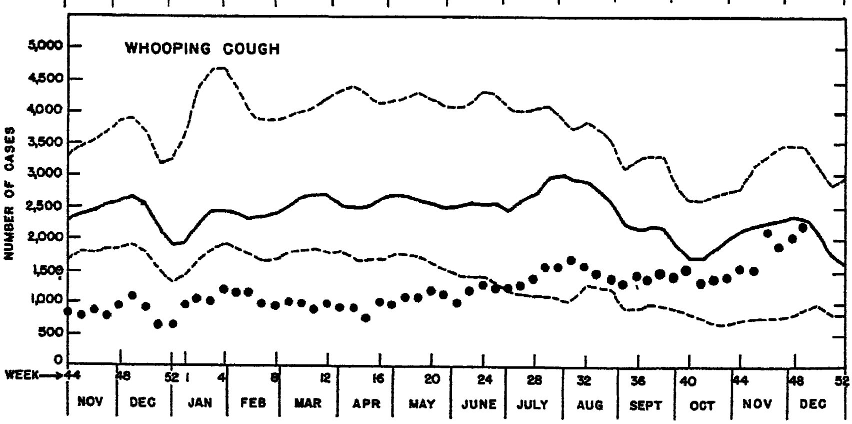
Leprosy: California, week ended Nov. 26, 1 case.
Alaska: Measles 44, pneumonia 1.
Hawaii: Influenza 229, measles 2.

Communicable Disease Charts

All reporting States, November 1948 through December 10, 1949







The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is the median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1949.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—Under date of December 7, 1949, plague infection was reported proved in 6 rats collected in District 6A, Honokaa Area, Hamakua District, Island of Hawaii, T. H. Three of these rats were killed, 2 found dead, on November 16, 1949, and 1 found dead on November 23.

Panama Canal Zone

Notifiable diseases—October 1949.—During the month of October 1949, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	5		5		8		1		19	
Diphtheria		1					1		1	1
Dysentery:										
Amebic	1						2		3	
Bacillary	1		1		1			1	3	1
Hepatitis, infectious					2		3		5	
Malaria [2]	1	1			3		76	1	80	2
Measles			1		8				9	
Meningitis, meningococcal							1		1	
Mumps	2				8				10	
Paratyphoid fever			1		3				4	
Pneumonia		5		6	25	3		7	[3] 25	21
Poliomyelitis					1			[4] 1	1	[4] 1
Tetanus							1		1	
Tuberculosis		16		8				8	([3])	32
Undulant fever	1								1	
Whooping cough		2		3	10				[3] 10	5
Yaws							5		5	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 5 recurrent cases.
[3] Reported in the Canal Zone only.
[4] Death from case reported in July 1949.

DEATHS DURING WEEK ENDED DECEMBER 10, 1949

	Week ended Dec. 10, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,535	9,453
Median for 3 prior years	9,649	
Total deaths, first 49 weeks of year	449,379	449,669
Deaths under 1 year of age	701	682
Median for 3 prior years	700	
Deaths under 1 year of age, first 49 weeks of year	32,066	32,669
Data from industrial insurance companies:		
Policies in force	69,968,453	70,772,413
Number of death claims	13,244	13,035
Death claims per 1,000 policies in force, annual rate	9.9	9.6
Deaths claims per 1,000 policies, first 49 weeks of year, annual rate	9.1	9.2

FOREIGN REPORTS

FINLAND

Notifiable diseases—October 1949.—During the month of October 1949, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	9	Poliomyelitis	54
Diphtheria	102	Scarlet fever	497
Dysentery	3	Syphilis	73
Gonorrhea	757	Typhoid fever	15
Paratyphoid fever	91		

JAPAN

Notifiable diseases—5 weeks ended October 29, 1949, and accumulated totals for the year to date.—For the 5 weeks ended October 29, 1949, and for the year to date, certain notifiable diseases were reported in Japan as follows:

Disease	5 weeks ended October 29, 1949		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Anthrax			10	
Dengue fever			5	
Diarrhea, infectious	6		528	
Diphtheria	1,284	81	11,732	1,122
Dysentery, unspecified	3,001	973	22,984	6,549
Encephalitis, Japanese "B"	428	193	1,336	485
Gonorrhea	16,712		154,725	
Influenza	29		1,900	
Leprosy	50		658	
Malaria	211	9	3,562	55
Measles	2,197		159,146	
Meningitis, epidemic	141	52	1,342	398
Paratyphoid fever	175	17	1,964	96
Pneumonia	6,332		115,353	
Poliomyelitis	352		2,762	
Puerperal infection	106		815	
Rabies	11		61	
Scarlet fever	316	3	3,706	54
Smallpox			120	12
Syphilis	17,027		163,305	
Tetanus	222		1,843	
Trachoma	13,367		156,549	
Tuberculosis	46,842		401,291	
Typhoid fever	684	106	5,624	705
Typhus fever	5		97	6
Whooping cough	9,541		111,082	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Ecuador—Loja Province.—During the period October 16–31, 1949, plague was reported in Loja Province, Ecuador, as follows: In Jujal, Sozoranga, Macara County, 1 case; in Las Huertas, Celica County, 1 case.

Netherlands Indies—Java—Jogjakarta.—During the week ended October 29, 1949, 71 fatal cases of plague were reported in Jogjakarta Residency, Java, including 6 cases in Jogjakarta City; for the week ended November 5, 53 cases, all fatal, were reported, including 6 cases in Jogjakarta City.

Peru—Tumbes Province.—During the month of November 1949, 1 case of plague was reported in Tumbes Province, Peru.

Smallpox

Argentina.—Smallpox (alastrim) has been reported in Argentina as follows: September 1–30, 1949, 95 cases, including 17 cases in Buenos Aires; October 1–31, 44 cases (11 of these in Buenos Aires).

Burma—Bassein and Rangoon.—During the week ended November 26, 1949, 24 cases of smallpox were reported in Bassein, Burma, and 25 cases in Rangoon.

Colombia.—For the month of October 1949, 135 cases of smallpox (alastrim) were reported in Colombia.

Pakistan—Chittagong.—During the week ended December 3, 1949, 10 cases of smallpox were reported in Chittagong, Pakistan.

Typhus Fever

Colombia.—During the period October 1–31, 1949, 171 cases of typhus fever (including cases of murine type) were reported in Colombia. The city of Medellin reported 29 cases, all murine type, for this period.

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The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. : 1949

For sale by the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price 10 cents. Subscription price $4.00 a year.

Public Health Reports

Issued Weekly by the

PUBLIC HEALTH SERVICE

Index

Volume 64—Part I

Nos. 1–25

January–June 1949

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY

Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE

Leonard A. Scheele, Surgeon General

Division of Public Health Methods

G. St. J. Perrott, Chief of Division

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Public Health Reports
Subject Index

Key to Dates and Pages

No.	Date of issue	Pages	No.	Date of issue	Pages
1	Jan. 7	1–40	14	Apr. 8	439–469
2	Jan. 14	41–68	15	Apr. 15	471–498
3	Jan. 21	69–92	16	Apr. 22	499–522
4	Jan. 28	93–120	17	Apr. 29	523–550
5	Feb. 4	121–160	18	May 6	551–588
6	Feb. 11	161–200	19	May 13	589–620
7	Feb. 18	201–228	20	May 20	621–656
8	Feb. 25	229–258	21	May 27	657–684
9	Mar. 4	259–302	22	June 3	685–716
10	Mar. 11	303–329	23	June 10	717–748
11	Mar. 18	331–354	24	June 17	749–784
12	Mar. 25	355–401	25	June 24	785–815
13	Apr. 1	403–438			

A

Page

Accident facts from accident fatalities [Halpin] 388
Accident prevention:
Introduction [Armstrong] 355
Research [King] 373
A State health department's responsibility [Beelman] 363
Accident-prone individual [Alexander] 357
Accidents, the home environment and [Board] 383
Actinomycosis cases:
Annual report for 1948 by State 806
Quarterly reports by State 228, 656
Alameda County, California, nursing service 523
Alaska:
Communicable diseases 35, 65, 113, 155, 196, 219, 247, 297, 326, 350, 393, 435, 463, 495, 541, 585, 617, 645, 677, 711, 743, 809
Influenza 192
American Board of Preventive Medicine and Public Health, Inc., formation 512
Animal colony, experimental, in tropical West Africa [Poindexter] 57

Page

Anthrax cases:
- Annual report for 1948 by State — 802
- Quarterly reports by State — 224, 652
- Weekly State reports — 65, 89, 155, 219, 247, 297, 350, 495, 519, 585, 617, 677, 743, 779

Antibiotic-producing coliform organisms, prevalence of [Halbert and Gravatt] — 313
Aureomycin: *See* Pertussis and
Australia:
- Measles — 249
- Poliomyelitis — 114

B

Blastomycin: *See* Histoplasmin and
Board of Preventive Medicine and Public Health, American — 512
Botulism cases:
- Annual report for 1948 by State — 806
- Quarterly reports by State — 228, 656

British National Health Service [Davis] — 161
Brucella abortus, isolation from hogs [McCullough, Eisele and Pavelchek] — 537

C

Canada:
- Communicable diseases — 36, 66, 90, 114, 156, 198, 220, 249, 299, 327, 352, 394, 436, 497, 520, 542, 586, 618, 648, 680, 714, 745, 782, 811
- Diphtheria — 220

Cancer:
- Cases:
  - Annual report for 1948 by State — 806
  - Quarterly reports by State — 228, 656
- National Cancer Institute program of postgraduate training for physicians [Spencer] — 750
- Professional education for, control [Deibert] — 749
- Teaching in dental schools [Kaiser] — 764
- Teaching in medical schools [Kaiser] — 757
- Tools for professional cancer education, new — 769

Ceylon: Poliomyelitis — 91, 352
Chickenpox cases:
- Annual report for 1948 by State — 802
- Quarterly reports by State — 224, 652

Cholera: Foreign reports — 91, 115, 199, 222, 252, 301, 328, 353, 395, 467, 521, 544, 587, 619, 649, 681, 715, 746, 811
Choriomeningitis, lymphocytic, cases:
- Annual report for 1948 by State — 806
- Quarterly reports by State — 228, 656

Cobalt and the dust environment of the cemented tungsten carbide industry [Fairhall, Keenan and Brinton] — 485
Coccidioidomycosis cases:
- Annual report for 1948 by State — 806
- Quarterly reports by State — 228, 656

Coliform organisms — 313

Collodion agglutination: Page
Technique 290
Test for histoplasmosis [Saslaw and Campbell] 424
Colombia: Typhoid fever 436
Colorado tick fever cases:
Annual report for 1948 by State 806
Quarterly reports by State 228
Commissioned Corps, Regular, Public Health Service examinations for engineer officers 159
Communicable disease charts:
Diphtheria 11, 517
Measles 111, 245, 391, 517, 646, 780
Meningitis, meningococcal 111, 391
Poliomyelitis 646, 780
Scarlet fever 245, 517, 780
Typhoid and paratyphoid fever 391
Whooping cough 245, 646
Communicable diseases—Current incidence by State 33, 63, 87, 110, 153, 194, 217, 244, 295, 324, 348, 390, 433, 461, 493, 516, 539, 583, 615, 643, 675, 709, 741, 777, 807
Conjunctivitis cases:
Annual report for 1948 by State 802
Quarterly reports by State 224, 652
Cuba:
Habana—Communicable diseases 91, 221, 436, 465, 746, 783
Provinces—Notifiable diseases 91, 221, 437, 465, 746, 783

D

DDT dusting, effects on domestic rats under colony and field conditions, [Dent, Morlan and Hill] 666
Deaths:
Large cities—Weekly reports (Weekly mortality index) 38, 68, 92, 120, 158, 197, 223, 258, 298, 329, 354, 401, 438, 464, 496, 515, 550, 588, 620, 651, 674, 713, 744, 781, 810
Tuberculosis—Map 708
Dengue cases:
Annual report for 1948 by State 806
Quarterly reports by State 228, 656
Dermatitis cases:
Annual report for 1948 by State 806
Quarterly reports by State 228, 656
Dextrose serum tellurite plating medium. Its use in diphtheria diagnosis [Whitley and Damon] 201
Diarrhea cases:
Annual report for 1948 by State 806
Quarterly reports by State 228, 656
Diarrheal disease control studies. II. Conical net for collecting flies [Maier and Dow] 604

Page

Diphtheria:
Canada ---- 220
Cases:
Annual report for 1948 by State ---- 802
Quarterly reports by State ---- 224, 652
Weekly State reports ---- 34, 64, 88, 112, 154, 195, 218, 246, 296, 325, 349, 392, 434, 462, 494, 518, 540, 584, 616, 644, 676, 710, 742, 778, 808
Diagnosis ---- 201, 457
Dog bite cases:
Annual report for 1948 by State ---- 806
Quarterly reports by State ---- 228, 656
Drugs, antimalarial, summary [Cooper] ---- 717
Dust environment ---- 485
Dysentery cases:
Annual report for 1948 by State ---- 802
Quarterly reports by State ---- 224, 652

E

Education, cancer ---- 749, 750, 757, 764, 769
Encephalitis cases:
Infectious:
Annual report for 1948 by State ---- 802
Quarterly reports by State ---- 224, 652
Weekly State reports ---- 34, 64, 88, 112, 154, 195, 218, 246, 296, 325, 349, 392, 434, 462, 494, 518, 540, 584, 616, 644, 676, 710, 742, 778, 808
Other forms:
Annual report for 1948 by State ---- 806
Quarterly reports by State ---- 228, 656
Engineer officers, Regular Corps, Public Health Service examinations ---- 159
Epidemiological terms, suggested. "Infection unit" and "index of aggregation" [Forsbeck] ---- 343
Erysipelas cases:
Annual report for 1948 by State ---- 806
Quarterly reports by State ---- 228, 656
Examinations: Public Health Service Commissioned Corps, Regular, engineer officers ---- 159

F

Favus cases:
Annual report for 1948 by State ---- 806
Quarterly reports by State ---- 228
Filariasis cases: Annual report for 1948 by State ---- 806
Finland:
Influenza ---- 251
Notifiable diseases ---- 249, 327, 394, 649, 714
Flocculation test as a possible method for differentiating immunologic types of the poliomyelitis virus [Roberts] ---- 212
Fluoroscopic screens, persistence of [Van Allen] ---- 560

Food poisoning cases: Page
Annual report for 1948 by State 806
Quarterly reports by State 228, 656
Foreign reports—Quarantinable diseases 36, 66, 90, 114, 156, 198, 220, 249, 299, 327, 352, 394, 436, 465 497, 520, 542, 586, 618, 648, 680, 714, 745, 782, 811

G

German measles cases:
Annual report for 1948 by State 802
Quarterly reports by State 224, 652
Gold Coast: Meningitis, cerebrospinal 437, 465, 542, 618
Gonorrheal specimens, simple and efficient transport method for [Peizer, Steffen and Klein] 599
Grants-in-aid for public health, ten years of—Review of Bulletin 300 [Mountin, Hankla and Druzina] 490
Granuloma inguinale cases:
Annual report for 1948 by State 806
Quarterly reports by State 228, 656

H

Hawaii:
Communicable diseases 35, 65, 89, 113, 155, 196, 219, 247, 297, 326, 350, 393, 435, 463, 495, 519, 541, 585, 617, 645, 677, 711, 743, 779, 809
Plague (in rodents and fleas) 464
Heart disease, statistical studies of:
III. Heart disease associated with other major causes of death as primary or contributory cause [Gover] 104
IV. Mortality from heart disease (all forms) related to geographic section and size of city [Gover] 439
Hepatitis: Japan 250
Histoplasmin and blastomycin, a comparison between, by the collodion agglutination technique. [Saslaw and Campbell] 290
Histoplasmosis:
Collodion agglutination test for [Saslaw and Campbell] 424
Use of yeast-phase antigens in a complement fixation test. III. Preliminary results with human sera. [Campbell and Saslaw] 551
Hookworm disease cases:
Annual report for 1948 by State 802
Quarterly reports by State 224, 652
Hospital maintenance and operation, State legislation for minimum standards of [Hoge and Steinle] 69

I

Impetigo contagiosa cases:
Annual report for 1948 by State 806
Quarterly reports by State 228, 656
Industrial hygiene agencies, work of State and local [Trasko] 471
Infant mortality and socioeconomic factors, relationship between, in urban areas [Altenderfer and Crowther] 331
Index of aggregation, epidemiological term suggested 343
Infection unit, epidemiological term suggested 343

Influenza: Page
Alaska 192
Cases:
Annual report for 1948 by State 802
Quarterly reports by State 224, 652
Weekly State reports 34, 64, 88, 112, 154, 195, 218, 246, 296, 325, 349, 392, 434, 462, 494, 518, 540, 584, 616, 644, 676, 710, 742, 778, 808
Europe 66, 157, 193, 251
Austrian Tyrol 193
Belgium 251
England 157
Finland 251
France 157, 193, 251
Germany 251
Holland 157, 193
Italy 66, 157, 193
Switzerland 157, 193
Turkey 157
New Zealand 586, 783
Nicobar Islands (India) 543
Puerto Rico 193
Report on recent outbreaks 157, 192, 251
United States 192
Venezuela 193
WHO report 192, 251
Interrelation of social problems (tuberculous patients)—editorial [Anderson] 685

J

Jamaica: Notifiable diseases 36, 198, 300, 465, 586, 714
Japan:
Hepatitis 250
Notifiable diseases 90, 221, 352, 520, 648, 782
Jaundice cases:
Annual report for 1948 by State 806
Quarterly reports by State 228, 656

K

Kala-azar: Annual report for 1948 by State 806

L

Lead poisoning cases: Quarterly report by State 228
Leprosy cases:
Annual report for 1948 by State 806
Quarterly reports by State 228, 656
Loeffler slants, adjunct to smears made from 201
Loeffler's medium, replacement for 457
Louisville, Ky., murine typhus fever in [Good and Kotcher] 229
Lymphogranuloma venereum cases:
Annual report for 1948 by State 806
Quarterly reports by State 228, 656

M

Page

Madagascar: Notifiable diseases 37, 156, 250, 467, 543, 715
Malaria:
Cases:
Annual report for 1948 by State 802
Quarterly reports by State 224, 652
Drugs 717
Map—White and nonwhite tuberculosis deaths as a percent of all tuberculosis deaths for each State and for the United States, 1947 708
Mauritius: Poliomyelitis 66, 250, 352, 497
Measles:
Australia 294
Cases:
Annual report for 1948 by State 802
Quarterly reports by State 224, 652
Weekly State reports 34, 64, 88, 112, 154, 195, 218, 246, 296, 325, 349, 392, 434, 462, 494, 518, 540, 584, 616, 644, 676, 710, 742, 778, 808
Meningitis:
Cerebrospinal:
Gold Coast 437, 465, 542, 618
Nigeria 618
Meningococcal:
Annual report for 1948 by State 802
Quarterly reports by State 224, 652
Weekly State reports 34, 64, 88, 112, 154, 195, 218, 246, 296, 325, 349, 392, 434, 462, 494, 518, 540, 584, 616, 644, 676, 710, 742, 778, 808
Mental health:
Act, national 303
Clinic: Community [Davens and Lemkau] 657
First annual report of Prince Georges County clinic [Ross] 797
Metopon hydrochloride. An experiment in clinical evaluation [Eddy] 93
Milk sanitation ratings of 90 percent or more during 1947 and 1948 241
Mononucleosis cases:
Annual report for 1948 by State 806
Quarterly reports by State 228, 656
Morbidity, specific diseases:
Annual report for 1948 by State 802
Quarterly reports by State 224, 652
Weekly State reports 33, 63, 87, 110, 153, 194, 217, 244, 295, 324, 348, 390, 433, 461, 493, 516, 539, 583, 615, 643, 675, 709, 741, 777, 807
Morphine derivative, new: Metopon hydrochloride 93
Mortality:
Heart disease 104, 439
Infant, and socioeconomic factors 331
Tuberculosis 403, 405, 687
Mumps cases:
Annual report for 1948 by State 802
Quarterly reports by State 224, 652
Muscogee County, Georgia, tuberculosis studies 259, 263

890594—50——2

N

Page

National Health Service, British [Davis] 161
National Mental Health Act, how it works [Lowry] 303
Netherlands: Psittacosis 157, 198
New Zealand:
  Influenza 586, 783
  Notifiable diseases 251, 300, 466, 542, 745
  Poliomyelitis 114, 327
Nicobar Islands (India): Influenza 543
Nigeria: Meningitis, cerebrospinal 618
Norway: Notifiable diseases 37, 251, 300, 543, 680
Notifiable diseases:
  Fourth quarter, 1948 652
  Third quarter, 1948 224
  Year 1948 802
Nursing service: Alameda County (Calif.) 523

O

Ophthalmia cases:
  Annual report for 1948 by State 802
  Quarterly reports by State 224, 652

P

Panama Canal Zone: Notifiable diseases 248, 351, 647, 679, 713
Panama carrier (typhoid fever) 671
Paratyphoid fever cases:
  Annual report for 1948 by State 804
  Quarterly reports by State 226, 654
Pasteurella pestis culture without transfer, twenty-five year survival of [Francis] 238
Pellagra cases:
  Annual report for 1948 by State 802
  Quarterly reports by State 224, 652
Pertussis and aureomycin [Bell, Pittman and Olson] 589
Philippines:
  Annual report of the tuberculosis control division [Young] 123
  Public health rehabilitation program [Young] 123
Plague:
  Culture survival without transfer [Francis] 238
  Diagnosis procedures, effect of sodium fluoroacetate (1080) in poisoned rats on. Preliminary report [Gratch, Purlia, and Martin] 339
  Foreign reports 38, 67, 92, 116, 157, 199, 222, 253, 301, 328, 353, 396, 437, 467, 497, 521, 545, 587, 619, 649, 681, 715, 746, 812
  Infection:
    Arizona 678, 712
    Colorado 781
    New Mexico 678, 712, 781, 810
    Texas 464, 678
    Utah 496, 810
    Washington 36, 298, 464, 496, 679, 712

Page

Pneumonectomy followed by immediate thoracoplasty [Iverson and Skinner] 140
Pneumonia (all forms) cases:
  Annual report for 1948 by State 802
  Quarterly reports by State 224, 652
  Weekly State reports 34, 64, 88, 112, 154, 195, 218, 246, 296, 325, 349, 392, 434, 462, 494, 518, 540, 584, 616, 644, 676, 710, 742, 778, 808
Poliomyelitis:
  Australia 114
  Cases:
    Annual report for 1948 by State 804
    Quarterly reports by State 226, 654
    Weekly State reports 34, 64, 88, 112, 154, 195, 218, 246, 296, 325, 349, 392, 434, 462, 494, 518, 540, 584, 616, 644, 676, 710, 742, 778, 808
  Ceylon 91
  Mauritius 66, 250, 352, 497
  New Zealand 114
  Prevalence of, in 1948 [Dauer] 733
  Reunion Island 544
  Virus, a flocculation test as a possible method for differentiating immunologic types of [Roberts] 212
Prince Georges County, Maryland, pilot mental health clinic 797
Psittacosis:
  Cases:
    Annual report for 1948 by State 806
    Quarterly reports by State 228, 656
    Weekly State reports 35, 196, 219, 809
  Netherlands 157, 198
Public health nursing service, time analysis of. Alameda County Health Department, 1946–47 [Malcolm, Moreland, Hopkins and Snyder] 523
Public Health Service:
  Examinations for engineer officers, Regular Commissioned Corps 159
  Publications, July–December, 1948 608
Puerperal septicemia cases:
  Annual report for 1948 by State 806
  Quarterly reports by State 228, 656
Puerto Rico:
  Influenza 193
  Notifiable diseases 197, 248, 351, 744, 810

Q

Q fever:
  Cases:
    Annual report for 1948 by State 806
    Quarterly report by State 228
    Weekly State report 541
  Studies in southern California:
    II. An epidemiological study of 300 cases [Beck, Bell, Shaw and Huebner] 41
    III. Effects of pasteurization on survival of *C. burneti* in naturally infected milk [Huebner, Jellison, Beck and Wilcox] 499

R

Page

Rabies cases:
- In animals:
  - Annual report for 1948 by State 806
  - Quarterly reports by State 228, 256
  - Weekly State reports 34, 64, 88, 112, 154, 195, 218, 246, 296, 325, 349, 392, 434, 462, 494, 518, 540, 584, 616, 644, 676, 710, 742, 778, 808
- In man:
  - Annual report for 1948 by State 804
  - Quarterly reports by State 226, 654
  - Weekly State reports 113

Rabies problems and control. A nation-wide program [Steele and Tierkel] 785

Raffinose serum tellurite agar slants as a replacement for Loeffler's medium in diphtheria diagnosis [Whitley and Damon] 457

Rat bite fever cases:
- Annual report for 1948 by State 806
- Quarterly reports by State 656

Relapsing fever cases:
- Annual report for 1948 by State 806
- Quarterly reports by State 228, 656

Reunion Island: Poliomyelitis 544

Rheumatic fever cases:
- Annual report for 1948 by State 804
- Quarterly reports by State 226, 654

Rickettsialpox cases:
- Annual report for 1948 by State 806
- Quarterly reports by State 228, 656

Ringworm cases:
- Annual report for 1948 by State 806
- Quarterly reports by State 228, 656

Rocky Mountain spotted fever cases:
- Annual report for 1948 by State 804
- Quarterly reports by State 226, 654
- Weekly State reports 34, 64, 88, 112, 154, 195, 218, 246, 296, 325, 349, 392, 434, 462, 494, 518, 540, 584, 616, 644, 676, 710, 742, 778, 808

S

Salmonella typhosa 58, avirulent isolate of (Panama carrier) [Batson, Landy and Abrams] 671

Scabies cases:
- Annual report for 1948 by State 806
- Quarterly reports by State 228, 656

Scarlet fever cases:
- Annual report for 1948 by State 804
- Quarterly reports by State 226, 654
- Weekly State reports 34, 64, 88, 112, 154, 195, 218, 246, 296, 325, 349, 392, 434, 462, 494, 518, 540, 584, 616, 644, 676, 710, 742, 778, 808

Schistosomiasis cases: Page
Annual report for 1948 by State ... 806
Quarterly reports by State ... 228, 656
Screens, fluoroscopic ... 560
Septic sore throat cases:
Annual report for 1948 by State ... 804
Quarterly reports by State ... 226, 654
Sickness absenteeism among industrial workers. Third and fourth quarters of 1948 [Gafafer] ... 641
Silicosis cases:
Annual report for 1948 by State ... 806
Quarterly reports by State ... 228, 656
Smallpox:
Cases:
Annual report for 1948 by State ... 804
Quarterly reports by State ... 226, 654
Weekly State reports ... 34, 64, 88, 112, 154, 195, 218, 246, 296, 325, 349, 392, 434, 462, 494, 518, 540, 584, 616, 644, 676, 710, 742, 778, 808
Foreign reports ... 38, 67, 92, 117, 157, 199, 222, 254, 301, 328, 353, 397, 438, 468, 498, 521 546, 587, 619, 649, 682, 716, 747, 784, 813
Vaccination, effect of, on the outcome of pregnancy [Bellows, Hyman and Merritt] ... 319
Social problems of tuberculous patients ... 685
Socioeconomic factors and infant mortality, relationship between, in urban areas [Altenderfer and Crowther] ... 331
Sodium fluoroacetate (1080) in poisoned rats, effect of, on plague diagnosis procedures [Gratch, Purlia and Martin] ... 339
Sodium hydroxide concentration techniques in tuberculosis diagnosis ... 574
Specimens, gonorrheal, transporting of ... 599
State health departments, current organizational pattern of statistical activities in [Swinney] ... 621
Studies of patients discharged from tuberculosis sanatoria. II. Mortality rates associated with selected characteristics of the patient population [Brewster and Fletcher] ... 687
Switzerland:
Influenza ... 157, 193
Notifiable diseases ... 466

T

Tetanus cases:
Annual report for 1948 by State ... 804
Quarterly reports by State ... 226, 654
Thoracoplasty following pneumonectomy [Iverson and Skinner] ... 140
Trachoma cases:
Annual report for 1948 by State ... 804
Quarterly reports by State ... 226, 654
Trichinosis cases:
Annual report for 1948 by State ... 804
Quarterly reports by State ... 226, 654

Page

Tuberele bacilli, demonstration in sputum smears. Selection of choice particles compared with various sodium hydroxide concentration techniques [Spendlove, Cummings and Patnode] 574
Tuberculin, coccidioidin, and histoplasmin sensitivity in relation to pulmonary calcifications [Beadenkopf, Loosli, Lack, Rice and Slattery] 17
Tuberculosis:
Cases:
Annual report for 1948 by State 804
Quarterly reports by State 226, 654
Control in the Philippines [Young] 123
Control program of nine California mental institutions [Oechsli] 4
Deaths—White and nonwhite 708
Diagnosis 574
Mental hospitals—editorial [Anderson] 1
Mortality in older age groups—editorial [Anderson] 403
Mortality in the United States, 1947 [Lewis] 405
Mortality rates associated with selected characteristics of patient population 687
Nursing in—editorial [Anderson] 121
Patients discharged from sanatoria, studies 687
Pneumonectomy followed by immediate thoracoplasty [Iverson and Skinner] 140
Research in Muscogee County, Ga 259, 263
Social problems 685
Studies in Muscogee County, Ga:
I. Community-wide tuberculosis research [Comstock] 259
II. X-ray findings in a community-wide survey and its coverage as determined by a population census [Burke, Schenck and Thrash] 263
Thoracoplasty following pneumonectomy [Iverson and Skinner] 140
Tularemia cases:
Annual report for 1948 by State 804
Quarterly reports by State 226, 654
Weekly State reports 34, 64, 88, 112, 154, 195, 218, 246, 296, 325, 349, 392, 434, 462, 494, 518, 540, 584, 616, 644, 676, 710, 742, 778, 808
Typhoid and paratyphoid fever:
Cases:
Annual report for 1948 by State 804
Quarterly reports by State 226, 654
Weekly State reports 34, 64, 88, 112, 154, 195, 218, 246, 296, 325, 349, 392, 434, 462, 494, 518, 540, 584, 616, 644, 676, 710, 742, 778, 808
Colombia 436
Typhus fever:
Endemic, cases:
Annual report for 1948 by State 804
Quarterly reports by State 226, 654
Foreign reports 38, 68, 92, 118, 200, 256, 302, 354, 398, 469, 498, 522, 548, 587, 650, 683, 716, 747, 784, 814
Murine, in Louisville, Ky. [Good and Kotcher] 229

U

Undulant fever cases: Page
Annual report for 1948 by State 804
Quarterly reports by State 226, 654

V

Venezuela: Influenza 193
Vincent's infection cases:
Annual report for 1948 by State 804
Quarterly reports by State 226, 654
Virgin Islands: Notifiable diseases 220, 647
Virus, poliomyelitis, flocculation test 212

W

Whooping cough cases:
Annual report for 1948 by State 804
Quarterly reports by State 226, 654
Weekly State reports 34,
64, 88, 112, 154, 195, 218, 246, 296, 325, 349, 392, 434, 462, 494,
518, 540, 584, 616, 644, 676, 710, 742, 778, 808
World Health Organization influenza report 192, 251

X

X-ray screens and films, characteristics of commercial—IV, V, VI [Van Allen] 430, 581, 706

Y

Yaws cases:
Annual report for 1948 by State 806
Quarterly reports by State 228, 656
Yellow fever:
Cases:
Annual report for 1948 by State 806
Quarterly reports by State 656
Foreign reports 68,
92, 120, 158, 200, 223, 257, 302, 329, 354, 400, 469, 498, 522, 549,
587, 620, 684, 716, 748, 784, 815

Public Health Service Author Index

Includes Papers by Public Health Service Personnel Printed in Public Health Reports and Other Publications January–June 1949*

A

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B

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——— *See also* Marshall, Louise H. (and Specht).
Spencer, R. R.: The mystery of cancer growth. Hygiea **27**: 322.
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Spendlove, George A. (Cummings and Patnode): Demonstration of tubercle bacilli in sputum smears. Selection of choice particles compared with various sodium hydroxide concentration techniques. Pub. Health Rep. **64**: 574.
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Spoto, Joseph F. (and Iskrant): Contact investigation of syphilis. J. Ven. Dis. Inform. **30**: 140.
Spriggs, John B.: *See* Binford, C. H. (and Spriggs); Gledhill, Emerson Y. (Spriggs and Binford).
Stark, T. H.: *See* Emmart, Emily W. (Kissling and Stark).
Steele, James H. (and Tierkel): Rabies problems and control. A nation-wide program. Pub. Health Rep. **64**: 785.
Steinle, John G.: *See* Hoge, Vane M. (and Steinle).
Stewart, H. L.: *See* Burgoyne, F. H. (Heston, Hartwell, and Stewart); Hare, W. V. (and Stewart).
Stewart, Laura C. (Richtmyer and Hudson): Trehalose from yeast. J. Am. Chem. Soc. **71**: 2277.
Stoenner, H. G.: *See* Bell, E. J. (Parker and Stoenner); Parker, R. R. (Bell and Stoenner).
Stohlman, E. F. (Thorp and Smith): Pharmacologic action of chlordane (abstract). Federation Proc. **8**: 334.
Strauss, R. C.: Occupational mortality rates, 1950 subject of study. Indust. Hyg. Newsletter **9**: 2, Jan.
Striebich, Mary J.: *See* Dalton, Albert J. (Kahler, Kelly, Lloyd, and Striebich); Dalton, Albert J. (Kahler, Lloyd, and Striebich).
Sullivan, Catherine M.: No help needed [orthopedic nursing]. Am. J. Nursing **49**: 90.
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Szent-Györgyi, Albert: Free-energy relations and contraction of actomyosin. Biol. Bull. **96**: 140.
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T

Tabor, Herbert: Purification of diamine oxidase (histaminase) (abstract). Federation Proc. **8**: 335.

Tauber, Henry: Isolation of a crystalline heat stable trypsin inhibitor from lima beans (abstract). Federation Proc. **8**: 259.

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Taylor, D. Jane: *See* Josephson, Edward S. (Taylor, Greenberg, and Nadel); Nadel, Eli M. (Taylor, Greenberg, and Josephson).

Terry, Luther L.: Oral aluminum penicillin, a clinical study. South. M. J. **42**: 507.

Thayer, J. D.: *See* Carpenter, Charles M. (Bucca, Buck, Casman, Christensen, Crowe, Drew, Hill, Lankford, Morton, Peizer, Shaw, and Thayer).

Thorp, W. T. S.: *See* Stohlman, E. F. (Thorp and Smith).

Tibbitts, Clark: Adjustment in old age—The beginning of a university experiment. Michigan Alumnus **55**: 234.

Tiboni, Emil A.: Housing and health. Appraisal of substandard housing. Am. J. Pub. Health **39**: 459.

Tierkel, Ernest S.: *See* Steele, James H. (and Tierkel).

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Tschirgi, R. D. (Gerard, Jenerick, Boyarsky, and Hearon): Metabolism of the rat spinal cord functioning in isolation (abstract). Federation Proc. **8**: 166.

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Tullner, William W.: *See* Hertz, Roy (Dhyse and Tullner); Hertz, Roy (and Tullner).

V

Van Allen, Willard W.: Characteristics of commercial X-ray intensifying screens and films—IV. Pub. Health Rep. **64**: 430.
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Vogel, F. E.: *See* Davis, Dorland J. (and Vogel).
*Vogel, Victor H. (Chapman and Isbell): The present status of narcotic addiction with particular reference to medical indications and comparative addiction liability of the newer and older analgesic drugs. J. Am. Med. Assoc. **138**: 1014.
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W

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Watt, James: Fly control and the acute diarrheal diseases. Bol. Ofic. san. panam. **28**: 233.
*Waugh, Richey L. (and Yancey): Carpometacarpal dislocations with particular reference to simultaneous dislocation of the bases of the fourth and fifth metacarpals. J. Bone and Joint Surg. **30–A**: 397
Webster, Stewart H.: Heinz body phenomenon in erythrocytes. Blood **4**: 479.
——— (Liljegren and Zimmer): Heinz body formation by certain chemical agents. J. Pharm. and Exper. Therap., **95**: 201.

White, Julius: *See* Fones, William S. (and White).

Wight, Kent (and Burk): Progesterone and testosterone reversal of diethylstilbestrol inhibition of succinoxidase of tumor mitochondrial elements (abstract). Federation Proc. **8**: 265.

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Wilkerson, Hugh L. C.: Diabetes as a public health problem. Nat. Negro Health News **17**: 6, Jan.–June.

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Woolsey, Theodore D.: Planning the morbidity survey. Am. J. Pub. Health **39**: 743.

Wright, John T.: *See* Bell, J. Frederick (Wright and Habel); Habel, Karl (Bell and Wright).

Wright, Robert D. *See* Arnold, R. C. (Mahoney, Nicholson, and Wright); Mahoney, John F. (Wright and Trautman).

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Y

Yagoda, Herman: Photographic recording media [for radioactive radiations]. Nucleonics **4**: 134.

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See also von Oettingen, W. F. (Donahue, Yagoda, Monaco, and Harris).

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Yiengst, Marvin J. (and Shock): *See also* Farber, Herbert R. (Yiengst and Shock).
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Z

Zimmer, D. J.: *See* Webster, Stewart H. (Liljegren and Zimmer).
Zipkin, I. (and McClure): Inhibitory effect of fluoride on tooth decalcification by citrate and lactate in vivo. J. Dent. Res. **28:** 151.
Zohman, Burton L.: *See* Russek, Henry I. (and Zohman).
Zwally, Margaret R.: *See* Mahoney, J. F. (and Zwally).

O

Public Health Reports

Issued Weekly by the

PUBLIC HEALTH SERVICE

Index

Volume 64—Part II

Nos. 26–52

July–December 1949

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1951

For sale by the Superintendent of Documents, U. S. Government Printing Office Washington 25, D. C. Index, 10 cents. Regular issues, 10 cents. Subscription price $4.00 a year

Public Health Reports

Subject Index

Key to Dates and Pages

No.	Date of issue	Pages	No.	Date of issue	Pages
26	July 1	817–855	40	Oct. 7	1247–1286
27	July 8	857–884	41	Oct. 14	1287–1310
28	July 15	885–908	42	Oct. 21	1311–1330
29	July 22	909–932	43	Oct. 28	1331–1362
30	July 29	933–959	44	Nov. 4	1363–1402
31	Aug. 5	961–990	45	Nov. 11	1403–1437
32	Aug. 12	991–1020	46	Nov. 18	1439–1498
33	Aug. 19	1021–1059	47	Nov. 25	1499–1537
34	Aug. 26	1061–1096	48	Dec. 2	1539–1574
35	Sept. 2	1097–1132	49	Dec. 9	1575–1602
36	Sept. 9	1133–1168	50	Dec. 16	1603–1630
37	Sept. 16	1169–1194	51	Dec. 23	1631–1654
38	Sept. 23	1195–1222	52	Dec. 30	1655–1677
39	Sept. 30	1223–1246			

A

Absenteeism, industrial sickness 1350
Actinomycosis: United States: Quarterly report by State 932, 1310, 1624
Allergy producing characteristics of vaccines 1251
Amblyomma maculatum, serological characteristics of a pathogenic *Rickettsia* occurring in 1342
Ambrosia elatior (ragweed pollen) 1195
Anthrax: United States:
Quarterly report by State 927, 1306, 1620
Weekly report by State 880, 905, 923, 1090, 1128, 1281, 1326, 1433, 1495, 1530, 1598, 1651
Antigen sensitivity among student nurses 820
Apparatus for controlling temperatures of film-processing solutions [Van Allen] 968

B

BCG vaccination, prospectus of research in mass [Palmer] 1250
Beds, hospital, for the tuberculous 1098
Botulism: United States: Quarterly report by State 932, 1310, 1624
Brucella, oral administration of killed, to man [McCullough, Eisele, and Beal] 1613

Brucellosis in Minnesota:
An epidemiological study of [McGoffin, Kabler, Spink, and Fleming] 1021
Relation of human and bovine [Fleming and Roepke] 1044
Brucellosis symposium, National Institutes of Health, Sept. 22 and 23, 1949 1051

C

Calcification:
Pulmonary lesions associated with sensitivity to histoplasmin [Furculow] 1363
Pulmonary, sensitivity to tuberculin and to histoplasmin 820
Cancer: United States: Quarterly report by State 932, 1310, 1624
Cancer control program, State, proposed [Kaiser] 1169
Caries experience, dental 1403
Case registers [Bellows] 1148
Case reporting, tuberculosis 961
Case-work services, tuberculosis 1541
Cellulose tape, a method of supplying, to physicians for diagnosis of enterobiasis [Brooke, Donaldson, and Mitchell] 897
Chagas: United States: Quarterly report by State 1310
Chemists and biochemists examination 1402
Chickenpox: United States: Quarterly report by State 927, 1306, 1620
Cholera:
Burma 854, 883, 908, 926, 989, 1019, 1304
Ceylon 883, 1058, 1629
China 1058
India 883, 989, 1019, 1131, 1193
Pakistan 989, 1304
Siam 854
World distribution: Asia 955, 1092, 1241, 1357, 1532
Choriomeningitis, lymphocytic: United States: Quarterly report by State 932, 1310, 1624
Chronic disease prevalence with particular reference to syphilis [Kahn and Smith] 1201
Coccidioidomycosis: United States: Quarterly report by State 932, 1310, 1624
Colorado tick fever: United States: Quarterly report by State 932, 1310, 1624
Commissioned Corps examinations 1402
Communicable Disease Center:
Refresher courses 1059
Training courses 1619
Communicable disease charts:
Diphtheria 903, 1570, 1674
Meningitis, meningococcal 903
Poliomyelitis 903, 1016, 1164, 1282, 1395
Scarlet fever 1395, 1674
Typhoid and paratyphoid fever 1016, 1164, 1570
Whooping cough 1016, 1282, 1570, 1674
Communicable diseases:
United States (including Alaska and Hawaii): Incidence, current, by State 849, 878, 902, 921, 950, 985, 1013, 1053, 1088, 1126, 1161, 1188, 1217, 1237, 1279, 1299, 1324, 1353, 1394, 1431, 1493, 1528, 1567, 1596, 1625, 1649, 1671
See also Notifiable diseases; specific disease.

Concept of multiphasic screening [Chapman] 1311
Conjunctivitis: United States: Quarterly report by State 927, 1306, 1620
Corybacterium diphtheriae, nomenclature of strains 1181
Courses, laboratory 1059, 1619
Coxiella burnetii:
From *H. savignyi* collected in Spain [Parker, de Prada, Bell, and Lackman] 1616
Infection, spontaneous, of the brown dog tick, *Rhipicephalus sanguineus*, with [Parker and Sussman] 1159

D

DDT residual house spraying for filariasis control 857, 863
Death rates, tuberculosis, rural and urban 1269
Deaths: United States: Weekly mortality index 855, 881, 901, 924, 953, 990, 1017, 1056, 1096, 1132, 1168, 1193, 1220, 1246, 1286, 1305, 1330, 1356, 1398, 1437, 1498, 1537, 1574, 1599, 1628, 1654, 1675
Dengue: United States: Quarterly report by State 932, 1310, 1624
Dental caries experience 1403
Denver rheumatic fever diagnostic services 1631
Dermatitis: United States: Quarterly report by State 932, 1310, 1624
Detroit conference, tuberculosis morbidity reporting 967
Diagnosis, refresher courses in laboratory 1059
Diarrhea: United States: Quarterly report by State 932, 1310, 1624
Diphtheria: United States:
Quarterly report by State 927, 1306, 1620
Weekly report by State 850, 879, 880, 904, 905, 922, 951, 986, 1014, 1054, 1089, 1127, 1162, 1189, 1218, 1238, 1280, 1300, 1325, 1354, 1396, 1432, 1494, 1529, 1568, 1597, 1626, 1650, 1672
Disease, water-borne 888
Distribution and salaries of directors of vital statistics and statisticians in State health departments as of August 1948 [Swinney] 1133
Dog bite: United States: Quarterly report by State 932, 1310, 1624
Dogs, histoplasmosis in 1562
Dysentery: United States: Quarterly report by State 927, 1306, 1620

E

Education for tuberculosis nursing. Editorial [Anderson] 1247
Encephalitis, infectious: United States:
Quarterly report by State 927, 1306, 1620
Weekly report by State 850, 879, 880, 904, 905, 922, 927, 986, 1014, 1054, 1089, 1127, 1162, 1189, 1218, 1238, 1280, 1300, 1325, 1354, 1396, 1432, 1494, 1529, 1568, 1597, 1626, 1650, 1672
Encephalitis, Japanese "B": Korea 1241
Encephalitis, other forms: United States: Quarterly report by State 932, 1624
Enterobiasis, a method of supplying cellulose tape to physicians for diagnosis of [Brooke, Donaldson, and Mitchell] 897
Epidemic, poliomyelitis 1584
Erysipelas: United States: Quarterly report by State 932, 1310, 1624
Examinations: Commissioned Corps 1402

F

Favus: United States: Quarterly report by State 932, 1624
Filariasis: United States: Quarterly report by State 932
Filariasis control by DDT residual house spraying, Saint Croix, Virgin Islands: I. Operational aspects. [Kohler] II. Results [Brown and Williams] 857, 863
Film-processing solutions 968
Fleas, rat 933
Fluorides, effect of topically applied, on dental caries experience. VII. Consolidated report of findings [Knutson and Scholz] 1403
Fluorine in foods. Survey of recent data [McClure] 1061
Food poisoning: United States: Quarterly report by State 932, 1310, 1624
Foreign reports: *See* Specific disease; notifiable diseases.

G

German measles: United States: Quarterly report by State 927, 1306, 1620
Granuloma: United States:
Inguinale: Quarterly report by State 932, 1310
Unspecified: Quarterly report by State 1310

H

Health center and auxiliary facilities 1002
Health is everybody's business [Derryberry] 1293
Heart disease, statistical studies of. V. Illness from heart and other cardiovascular-renal diseases recorded in general morbidity surveys of families [Collins] 1439
Hepatitis: *See* Jaundice.
Histoplasma capsulatum, isolation of, from soil [Emmons] 892
Histoplasmin reaction in the detection of naturally occurring histoplasmosis in dogs, evaluation of [Prior, Cole, and Torbert] 1562
Histoplasmin, sensitivity to 820, 1363
Histoplasmosis:
Geographical limits extended 1430
In dogs 1562
In rats and skunks in Georgia [Emmons, Morlan, and Hill] 1423
United States: Quarterly report by State 1310, 1624
Hookworm disease: United States: Quarterly report by State 927, 1306, 1620
Hospital beds for the tuberculous 1098
Hospital services and practices standards 1499
Hospital survey and construction program. Progress report [Hoge] 991
Hospitals and sanatoria with tuberculosis beds in the United States and Territories, index of 1099
Housing Act of 1949 and health department programs [Johnson] 1331
Housing, better, physiological aspects [Specht and Neal] 1337
Hyalomma savignyi 1616

I

Illness from heart and other cardiovascular-renal diseases [Collins] 1439
Impetigo contagiosa: United States: Quarterly report by States 932, 1310, 1624
Industrial sickness absenteeism. Males and females, 1948, and males, first and second quarters, 1949 [Gafafer] 1350

Infection of the brown dog tick, *Rhipicephalus sanguineus*, with *Coxiella burnetii*, spontaneous [Parker and Sussman] 1159
Influenza: United States:
Quarterly report by State 927, 1306, 1620
Weekly report by State 850, 879, 880, 904, 905, 922, 951, 986, 1014, 1054, 1089, 1127, 1162, 1189, 1218, 1238, 1280, 1300, 1325, 1354, 1396, 1432, 1494, 1529, 1568, 1597, 1626, 1650, 1672
Investigation of low mortality in certain areas [Woolsey] 909
Iodine—A food essential [Sebrell] 1075

J

Jaundice: United States: Quarterly report by State 932, 1310, 1624
Joint Enterprise BCG vaccination program 1250

L

Laboratory courses:
Diagnosis refresher 1059
Training 1619
Lead poisoning: United States: Quarterly report by State 1310, 1624
Leprosy: United States:
Quarterly report by State 932, 1310, 1624
Weekly report by State 987, 1055, 1090, 1190,1281 1433,1569, 1673
Lice, human body, *Pediculus humanus corporis*, studies. I. A method of feeding [Fuller, Murray, and Snyder] 1287
Lymphogranuloma venereum: United States: Quarterly report by State 932, 1310

M

Malaria: United States: Quarterly report by State 927, 1306, 1620
Measles:
British Guiana 1191
United States:
Quarterly report by State 927, 1306, 1620
Weekly report by State 850, 879, 880, 904, 905, 922, 951, 986, 1014, 1054, 1089, 1127, 1162, 1189, 1218, 1238, 1280, 1300, 1325, 1354, 1396, 1432, 1494, 1529, 1568, 1597, 1626, 1650, 1672
Meningitis, meningococcal: United States:
Quarterly report by State 927, 1306, 1620
Weekly report by State 850, 879, 880, 904, 905, 922, 951, 986, 1014, 1054, 1089, 1127, 1162, 1189, 1218, 1238, 1280, 1300, 1325, 1354, 1396, 1432, 1494, 1529, 1530, 1568, 1597, 1626, 1650, 1672
Mental health through the schools 1655
Milk pasteurizers, home, studies 1411
Milk sanitation ratings, July 1947–June 1949 1010
Molluscacides, preliminary field trials with laboratory-tested [Nolan and Berry] 942
Moniliasis: United States: Quarterly report by State 1310
Mononucleosis: United States: Quarterly report by State 932, 1310, 1624
Morbidity reports: *See* Communicable diseases; notifiable diseases; specific disease.

Mortality:
Areas, low 909
Index and standard of living 917
Tuberculosis 1261
Multiphasic screening 1311
Mumps: United States: Quarterly report by State 927, 1306, 1620

N

National Institutes of Health brucellosis symposium 1051
Nomenclature of strains of *C. diphtheriae* [Johnstone and McCleod] 1181
Nosopsyllus fasciatus (rat flea) 933
Notifiable diseases:
British Guiana 1191
Canada 852, 882, 906, 925, 955, 988, 1018, 1057, 1091, 1130, 1166, 1191, 1220, 1240, 1283, 1303, 1327, 1356, 1399, 1434, 1496, 1531, 1571, 1600, 1628, 1652
Cuba 907, 1240, 1399, 1434, 1601, 1653
Egypt 1191
Finland 907, 1091, 1192, 1284, 1400, 1570, 1676
India 1130
Jamaica 853, 989, 1166, 1303, 1435, 1653
Japan 925, 1018, 1192, 1328, 1496, 1675
Madagascar 852, 1131, 1167, 1221, 1572
New Zealand 853, 1131, 1167, 1284, 1303, 1572, 1653
Norway 882, 988, 1057, 1192, 1328, 1435, 1629
Switzerland 853, 1329
United States:
Panama Canal Zone 881, 954, 1129, 1302, 1398, 1599, 1675
Puerto Rico 954, 1130, 1302, 1356, 1652
Quarterly report by State 927, 1306, 1626
Virgin Islands 1017, 1600
See also: Communicable diseases; specific disease.
Nurses, student, studies of pulmonary findings and antigen sensitivity among 820
Nursing, education for tuberculosis 1247
Nursing care for the tuberculous [Bush, McNett, Petry, and Naylor] 971
Nutrition demonstration program in Ottawa County, Michigan, report of [Osborne, Tabor, Bouser, Anderson, and Frankhauser] 1603

O

Ophthalmia neonatorum: United States: Quarterly report by State 927, 1306, 1620
Oral administration of killed *Brucella* 1613
Ottawa County, Michigan, nutrition demonstration program 1603

P

Paratyphoid fever: United States: Quarterly report by State 930, 1308, 1622
See also: Typhoid and paratyphoid fever
Pasteurizers, operation studies of home milk [Thomas] 1411
Patient care, better, through coordination [McGibony and Block] 1499
Pediculus humanus corporis, studies of human body lice 1287
Pellagra: United States: Quarterly report by State 927, 1306, 1620

Plague:
- Basutoland ---- 1058, 1193
- Belgian Congo ---- 908, 989, 1019, 1193, 1285, 1654
- Brazil ---- 908, 1400, 1573
- British East Africa ---- 926, 1019
- China ---- 1329, 1629
- Ecuador ---- 1285, 1497, 1629, 1677
- India ---- 854, 883, 908, 926, 1019
- Indochina ---- 1019
- Indochina (French) ---- 1654
- Java ---- 854, 1329
- Madagascar ---- 1193, 1329, 1573, 1601
- Netherlands Indies ---- 1286, 1400, 1497, 1573, 1601, 1629, 1654, 1677
- Peru ---- 908, 1286, 1436, 1573, 1677
- Portugal ---- 883
- Siam ---- 1497
- Union of South Africa ---- 1019, 1167, 1193, 1304, 1329, 1434, 1629
- United States:
  - Hawaii ---- 1599
  - New Mexico ---- 1056, 1165, 1530
  - Quarterly report by State ---- 1624
- World distribution:
  - Africa ---- 956, 1092, 1242, 1358, 1532
  - Asia ---- 956, 1092, 1242, 1358, 1533
  - Europe ---- 956, 1093, 1242, 1359, 1533
  - North America ---- 1093
  - Oceania ---- 956, 1093, 1242, 1359, 1533
  - South America ---- 956, 1093, 1242, 1359, 1533

Plague infection:
- Colorado ---- 906, 1017, 1091, 1129, 1220, 1283
- Hawaii ---- 1129, 1165, 1283, 1398, 1599, 1628, 1652, 1675
- Kansas ---- 1056, 1091, 1129
- Montana ---- 906, 953
- New Mexico ---- 906, 1056, 1165
- Wyoming ---- 924, 1091

Plague surveillance traps compared ---- 1214

Pneumonia: United States:
- Quarterly report by State ---- 927, 1306, 1620
- Weekly report by State ---- 850, 879, 880, 904, 905, 922, 951, 986, 1014, 1054, 1089, 1127, 1162, 1189, 1218, 1238, 1300, 1325, 1354, 1396, 1432, 1494, 1529, 1568, 1597, 1626, 1650, 1672

Poliomyelitis:
- Australia ---- 1240, 1284
- Canada ---- 1284
- England and Wales ---- 1284
- France ---- 1284
- Germany—British Zone ---- 1285
- Greece ---- 1285
- India ---- 1285
- Italy ---- 1285
- Luxemburg ---- 1285
- Mexico ---- 1285

923650—51——2

Poliomyelitis—*Continued*
New Zealand 1285
Poland 1285
Scotland 1285
Sweden 1285
United States:
Quarterly report by State 930, 1308, 1622
Weekly report by State 850, 879, 904, 922, 951, 986, 1014, 1054, 1089, 1127, 1162, 1189, 1218, 1238, 1280, 1300, 1325, 1354, 1396, 1432, 1494, 1529, 1568, 1597, 1626, 1650, 1672
Yugoslavia 1285
Poliomyelitis epidemic recurrence in the counties of the United States, 1932–1946 [Gilliam, Hemphill, and Gerende] 1584
Poliomyelitis incidence reported in the counties of the United States, 1932–1946, average [Gilliam, Hemphill, and Gerende] 1575
Psittacosis: United States:
Quarterly report by State 932, 1310, 1624
Weekly report by State 880, 1015, 1495, 1569, 1627
Public health approach to improving community mental health through the schools [Ullmann] 1655
Public Health Service publications, January–June, 1949 1642
Pulmonary findings and antigen sensitivity among student nurses, studies of [Goddard, Edwards, and Palmer] 820

Q

Q fever: United States: Quarterly report by State 1310, 1624
Q fever, incidence of, in eastern Washington [Doddananjaya] 1230
Quarantine provisions of Ireland 1437
Queen Anne's County, Md., chronic disease prevalence 1201

R

Rabies in animals: United States:
Quarterly report by State 932, 1310, 1624
Weekly report by State 850, 879, 880, 904, 905, 922, 951, 986, 1014, 1054, 1089, 1127, 1162, 1189, 1218, 1238, 1280, 1300, 1325, 1354, 1396, 1432, 1494, 1529, 1568, 1597, 1626, 1650, 1672
Rabies in man: United States:
Quarterly report by State 930, 1308, 1622
Weekly report by State 1495
Ragweed pollen, specific gravity of [Crawford] 1195
Rat-bite fever in Montana [Jellison, Eneboe, Parker, and Hughes] 1661
Rat-bite fever: United States: Quarterly report by State 1310, 1624
Rats and skunks, histoplasmosis in 1423
Relapsing fever: United States:
Quarterly report by State 932, 1310, 1624
Weekly report by State 987, 1090, 1128, 1190, 1219, 1397, 1495
Reservoir operation and stream water quality 1223
Rheumatic fever diagnostic service, Denver. Purpose and method of operation [Darley] 1631
Rheumatic fever: United States: Quarterly report by State 930, 1308, 1622
Rhipicephalus sanguineus 1159

Rickettsia, pathogenic, occurring in *Amblyomma maculatum*, serological aspects [Lackman, Parker, and Gerloff] 1342
Rickettsia prowazeki, *R. mooseri*, and *Borrelia novyi*, experimental infection with 1287
Rickettsialpox: United States: Quarterly report by State 932, 1310, 1624
Ringworm disease: United States: Quarterly report by State 932, 1310, 1624
Rocky Mountain spotted fever: United States:
    Quarterly report by State 930, 1308, 1622
    Weekly report by State 850, 879, 880, 904, 905, 922, 951, 986, 1014, 1054, 1089, 1127, 1162, 1189, 1218, 1238, 1280, 1300, 1325, 1354, 1396, 1432, 1494, 1529, 1568, 1597, 1626, 1650, 1672
Rural life and tuberculosis 1271

S

Saint Croix, Virgin Islands, filariasis control 857, 863
Salaries of vital statistics directors and statisticians in State Health Departments 1133
Salmonella enteritidis, transmission of, by the rat fleas *Xenopsylla cheopis* and *Nosopsyllus fasciatus* [Eskey, Prince, and Fuller] 933
Salmonella types encountered in Maryland between 1944 and 1948 [Hajna] 876
San Antonio plan in tuberculosis control 1541
Sanitary engineering training in the United States, undergraduate [Straub] 1315
Sanitation defects on vessels 1667
Scabies: United States: Quarterly report by State 932, 1310, 1624
Scarlet fever: United States:
    Quarterly report by State 930, 1308, 1622
    Weekly report by State 850, 879, 880, 904, 905, 922, 951, 986, 1014, 1054, 1089, 1127, 1162, 1189, 1218, 1238, 1280, 1300, 1325, 1354, 1396, 1432, 1494, 1529, 1568, 1597, 1626, 1650, 1672
Schistosomiasis: United States: Quarterly report by State 932, 1310, 1624
Schools, mental health through 1655
Screening, multiphasic 1311
Septic sore throat: United States: Quarterly report by State 930, 1308, 1622
Septicemia, puerperal: United States: Quarterly report by State 932, 1310, 1624
Sickness absenteeism, industrial 1350
Silicosis: United States: Quarterly report by State 932, 1310, 1624
Skin tests to detect histoplasmosis in dogs 1562
Skunks, histoplasmosis in rats and 1423
Smallpox:
    Afghanistan 1193, 1222
    Algeria 1629
    Arabia 926, 1058, 1193, 1654
    Argentina 1305, 1573, 1677
    Australia 926
    Belgian Congo 1629
    Belgium 883
    Burma 1602, 1677
    Colombia 883, 989, 1401, 1602, 1677
    Cuba 854
    Egypt 989
    French Equatorial Africa 1058, 1222, 1573, 1602

Smallpox—Continued
French West Africa 854, 1436, 1497
Great Britain 883, 1602
Italy 854, 883
Japan 854
Java 883, 908, 926, 990
Manchuria 1132
Mexico 990, 1436, 1497, 1573
Mozambique 854
Netherlands Indies 854, 855, 1019, 1058, 1132, 1168, 1222, 1286, 1329, 1401, 1602
Niger Territory 1630
Nigeria 883, 926, 1019, 1330, 1497
Pakistan 1677
Peru 1286, 1497, 1630
Portugal 1193
Spain 926
Syria 1602
Union of South Africa 1436
United States:
Quarterly report by State 930, 1308, 1622
Weekly report by State 850, 879, 880, 904, 905, 922, 951, 986, 1014, 1054, 1089, 1127, 1162, 1189, 1218, 1238, 1280, 1300, 1325, 1354, 1396, 1432, 1494, 1529, 1568, 1597, 1626, 1650, 1672
Venezuela 990
World distribution:
Africa 957, 1093, 1243, 1359, 1533
Asia 957, 1094, 1243, 1360, 1534
Europe 957, 1094, 1244, 1360, 1534
North America 958, 1094, 1244, 1360, 1534
Oceania 1094, 1244, 1360, 1535
South America 958, 1094, 1244, 1360, 1535
Smallpox vaccination requirements—Ireland 1437
Snap traps versus cage traps in plague surveillance [Gross and Bonnet] 1214
Social services in tuberculosis control. Editorial [Anderson] 1539
Soil, isolation of *Histoplasma capsulatum* from 892
Spain, recovery of *C. burnetii* from *H. savignyi* collected in 1616
Specific gravity determinations of ragweed pollen 1195
Standard of living and low mortality 917
State health department salaries—directors of vital statistics and statisticians 1133
Stream water quality, effects of reservoir operation on [Woodward and LeBosquet] 1223
Symposium on brucellosis, National Institutes of Health 1051
Syphilis prevalence 1201

T

Temperature control system for film-processing solutions 968
Tests, skin, to detect histoplasmosis in dogs 1562
Tetanus: United States: Quarterly report by State 930, 1308, 1622

Tick:
Brown dog 1159
Hyalomma savngnyi 1616
Rhipicephalus sanguineus 1159
Tick fever, Colorado: *See* Colorado tick fever.
Trachoma: United States: Quarterly report by State 930, 1308, 1622
Training, sanitary engineering undergraduate 1315
Training courses, laboratory 1619
Trichinosis: United States: Quarterly report by State 930, 1308, 1622
Tuberculin, sensitivity to 820
Tuberculosis:
BCG vaccination 1250
Beds in the United States [Hanna and Glaser] 1098
Case reporting 961
Case-work services 1541
Death rates 1269
Education for nursing 1247
Index. Editorial [Anderson] 1097
Morbidity reporting 967
Mortality relationships—Age, race, and sex, 1947 1261
Research 1250
Rural life and 1271
Sanatoria, nursing care in 971
Similarity to histoplasmosis 1363
United States: Quarterly report by State 930, 1308, 1622
What is a reportable case [Northrup, Anderson, and Sauer] 961
WHO, program, 1950 1117
Tuberculosis control:
Financial aid and case-work services to the tuberculous patient and family—San Antonio plan [Zeck] 1541
First five years [Scheele] 817
Rural areas [Roemer] 1269
Social services. Editorial [Anderson] 1539
Urban and rural 1273
Tularemia: United States:
Quarterly report by State 930, 1308, 1622
Weekly report by State 850, 879, 880, 904, 905, 922, 951, 986, 1014, 1054, 1089, 1127, 1162, 1189, 1218, 1238, 1280, 1300, 1325, 1354, 1396, 1432, 1494, 1529, 1568, 1597, 1626, 1650, 1672
Typhoid and paratyphoid fever: United States: Weekly report by State 850, 879, 880, 904, 905, 922, 951, 986, 1014, 1054, 1089, 1127, 1162, 1189, 1218, 1238, 1280, 1300, 1325, 1354, 1396, 1432, 1494, 1529, 1568, 1597, 1626, 1650, 1672
Typhoid fever:
Egypt 1191
Germany 1327
United States: Quarterly report by State 930, 1308, 1622
See also: Typhoid and paratyphoid fever.
Typhus fever:
Afghanistan 1020, 1058, 1193
Belgium 926
Bolivia 908

Typhus fever—Continued
British East Africa 926, 1193
Colombia 884, 990, 1401, 1602, 1677
Czechoslovakia 1222, 1305
Ethiopia 990, 1630
France 1286
Great Britain 1401
Iraq 1654
Mexico 1574
Peru 1286, 1497, 1630
Poland 1574
Portugal 1436
Puerto Rico 1497
Spain 1305, 1436
Union of South Africa 1020, 1436
United States: Quarterly report by State 930, 1308, 1622
World distribution:
Africa 958, 1095, 1244, 1361, 1535
Asia 958, 1095, 1245, 1361, 1535
Europe 958, 1095, 1245, 1361, 1535
North America 959, 1095, 1245, 1361, 1536
Oceania 959, 1096, 1245, 1362, 1536
South America 958, 1095, 1245, 1362, 1536

U

Undulant fever: United States: Quarterly report by State 930, 1308, 1622

V

Vaccination:
Requirements (smallpox): Ireland 1437
Research (antituberculosis) 1250
Vaccines, allergy producing characteristics 1251
Vessels, defects in the sanitary environment on [Graber and Miller] 1667
Vincent's infection: United States: Quarterly report by State 930, 1308, 1622

W

Water pollution control 890
Water requirements, urban 886
Water resources and the Nation's health [Pond] 885
Weil's disease. *See* Jaundice.
Whooping cough: United States:
Quarterly report by State 930, 1308, 1622
Weekly report by State 850, 879, 880, 904, 905, 922, 951, 986, 1014, 1054, 1089, 1127, 1162, 1189, 1218, 1238, 1280, 1300, 1325, 1354, 1396, 1432, 1494, 1529, 1568, 1597, 1626, 1650, 1672
World distribution of cholera, plague, smallpox, typhus fever, and yellow fever: *See* Cholera, etc.,: World Distribution.
World Health Organization tuberculosis program for 1950 [Reprinted from the Official Records No. 18] 1117

X

Xenopsylla cheopis (rat flea) 933
X-ray screens and films, characteristics of commercial. VII-X [Van Allen] 847, 979, 1124, 1560

Y

Yaws: United States: Quarterly report by State 932, 1310, 1624
Yellow fever:
  Brazil 1630
  Ecuador 1132
  French Equatorial Africa 1193
  Gold Coast 908, 1020, 1058, 1132, 1168, 1222, 1401, 1497, 1602
  Panama 1132, 1305
  Peru 1058, 1132, 1193, 1630
  Sudan (French) 1286
  United States: Quarterly report by State 1624
  World distribution:
    Africa 959, 1096, 1246, 1362, 1536
    North America 959, 1096, 1245, 1362, 1536
    South America 959, 1096, 1246, 1362, 1537

Public Health Service Author Index

Includes Papers by Public Health Service Personnel Printed in Public Health Reports and Other Publications July–December 1949*

A

Abraham, Sidney: *See* Rion, J. Wallace (and Abraham).
Adams, George: *See* Von Brand, Theodor (Tobie, Kissling, and Adams).
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